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AUTHOR Huraux-Rendu, Christine; And Others
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ABSTRACT

This issue of Children in the Tropics analyzes key issues relating to protecting the health of newborn infants. Many of the suggestions offered concern rudimentary health care situations in developing countries. Key issues are addressed in four sections. The first section discusses the early care and first medical examination of infants born in maternity hospitals. The value of breast feeding rather than formula feeding in developing countries is stressed and several minor health anomalies are listed. The section concludes with a discussion of desirable conditions for successful delivery and infant care at home. The second section reviews neonatal respiratory and cardiac pathologies and suggests techniques of dealing with several life-threatening situations which may arise at birth. Postnatal monitoring and participant training are recommended. The third section considers precautions relating to premature and small newborns, the care of fragile newborns, and common medical problems of fragile newborns. Problems typically experienced by hypertrophic newborns are also discussed. The fourth section covers several infant infections. A bibliography lists 2 English and 14 French texts. (BC)

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CHILDREN
IN THE TROPICS

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NEW BORNS...
GETTING A GOOD START

1991 - N° 190 / 191

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INTERNATIONAL CHILDREN'S CENTRE – PARIS

The International Children's Centre was created by the French government in 1949, on the initiative of Professor Robert Debré in particular, following negociations between France and the United Nations. Its purpose was to furnish those international and national agencies dealing specifically with child care with training facilities and educational and informational tools in the field of child health and development, viewing children within their family and surroundings.

ICC soon turned essentially toward Third World children and devoted its activities to the training and education of personnel with social, educational and administrative responsabilities as well as medical and paramedical workers. The desire for greater efficiency has led it to work increasingly with trainers and to concentrate its efforts on the methodological and educational aspects of mother and child care programmes.

ICC is also engaged in an attempt to further study — and — action on some aspects of the life and health of children and their family, so as to contribute to practical improvement, particularly in the fields of growth, nutrition, planned parenthood, the control of transmissible and nutritional diseases, preschool and school education, the needs of disabled and underprivileged children, etc.

Over this period of more than 30 years, a large amount of documents on children and adolescents, mostly from the developing countries, has been accumulated. This international documentation has been classified and sorted out, and has been computerized since 1983 : a bibliographic data base (BIRD : « Base d'Informations Robert Debré ») may be consulted anywhere in the world, through international communications networks. ICC also publishes periodicals, educational documents and specialized bibliographic bulletins.

As for its legal status, the International Children's Centre is a foundation under french law of recognized public utility, administered by an executive board with broad international membership.

CHILDREN
IN THE TROPICS

REVIEW OF THE INTERNATIONAL CHILDREN'S CENTRE

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NEW BORNS... GETTING A GOOD START

☐ CHRISTINE HURAUX-RENDU
☐ VERONIQUE SERIEYS
☐ JEAN-BERNARD JOLY
☐ JACQUES LALANDE
☐ MOHAMADOU FALL

1991 - N° 190 / 191

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CHRISTIANE HURAUX-RENDU	Paediatrician specialized in perinatology. Works in a maternity where she is in charge of normal and at-risk neonates.
	Heads the commission of maternity department paediatricians within the working group on neonatal studies and paediatric emergencies.
	Contributing author : "Pédiatrie en maternité", published in 1989 by Flammarion Médecine-Sciences.
	Participated in setting up neonatal resuscitation departments and a programme for controlling perinatal mortality in maternities, in Cuba.
	Works within the organization "Migration/Health", and also contributes to some ICC courses, and more particularly to those devoted to mother and child health.
VERONIQUE SERIEYS	Works as a midwife in Toulouse.
	Vice-president of the organization "Aide Médicale et Sanitaire (AMS) for Nepal (144, rue de Grenelle, 75005 Paris).
	Headed the AMS programme for training village birth attendants in Nepal for 18 months.
JEAN-BERNARD JOLY	Paediatrician, departmental head at the Centre Hospitalier Général in Angoulême.
	Has organized neonatology seminars in Hanoi, through APPEL for the last 6 years.
	In the framework of the twinning of the cities of Angoulême and Segou (Mali), has contributed to setting up mother and child care in the latter over the last 7 years.
JACQUES LALANDE	Paediatrician at the Nanterre maternity hospital.
	Consultant attached to the Louis Mourrier hospital in Colombes (greater Paris area).
	President of the association for aid to child war victims "APPEL" (89, rue de Flandres, 75019 Paris).
	Has organized neonatology seminars in Vietnam for the last 6 years.
	Participates in programmes for the development of paediatric care in many countries (Chad, Madagascar, Vietnam, Cambodia), with the French ministries of cooperation and foreign affairs.
	Contributing author to the book "Pédiatrie en maternité".
MOHAMADOU FALL	Heads the paediatrics department of the Albert Royer children's hospital in Dakar, Senegal.
SECRETARIAL WORK	Marie COUDRAY
TRANSLATION	Helen ARNOLD

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The child ...

"He is like the foundations of a house. If the foundations are not laid down properly, the house will fall apart as soon as it rains, and the village will not grow" (1).

(1) Amadou, Village Health Agent, 11th Health meeting in TOKOMBERE, North Cameroon, January 1988.

INTRODUCTION

"So, you have arrived ; do not kill either your father or your mother", "You will overcome the sun". These words, used to welcome newborns in Baoulé country are indicative of the importance and the power attributed to children as soon as they are born. But this power is terribly fragile, and everyone is aware of the risk that this stranger, this visitor, may return to the land of spirits from which he or she has come.

It is a fact that infantile mortality is still very high in many countries, occasionally as high as 200 per thousand live births in some parts of the African continent.

Table 1

INFANTILE MORTALITY AND SOCIOECONOMIC LEVEL

Country	Number	Infantile mortality for one thousand live births
Least advanced	31	160
Developing	89	94
Developed	37	19

Source : Conference on the least advanced countries, Paris, September 1981.

It is difficult to obtain accurate figures on neonatal mortality during the first week of life, but it is a known fact that twice as many children die during the first week of life as during the rest of the first year. This shows the need for prevention programmes reaching all strata of the population in the most underprivileged countries as well as in the developed countries, with the active participation of the entire community. Two issues of this journal have already dealt with prevention in obstetrics (n° 152) and the prevention of maternal mortality (n° 187/188). It is important to note that most of what are viewed as high priority actions for the control of maternal mortality have a most beneficial effect on the well-being of newborn infants. The three factors universally acknowledged to be most important are prenatal visits, delivery in a specialized establishment and birth control : all three also play a decisive role in combating perinatal mortality (1) through the detection of pregnancies in which there is a risk of a small-for-date or premature infant, the avoidance of severe anoxia during delivery and of transplacental infections. The famous British Perinatal Mortality Survey of 1958 showed that lack of attendance of prenatal consultations multiplied the risk of perinatal mortality by five, and the risk of prematurity by four ; the lack of medical surveillance of delivery multiplied the risk of perinatal mortality by three.

(1) Intrauterine death beyond 28 weeks of gestation and neonatal deaths during the first week of life.

In the 1970's, perinatal mortality and morbidity rates were practically cut in half in France within a ten-year period, thanks to the implementation of a policy for more complete perinatal care, including an increased number of prenatal visits, in particular. Many developing countries are now aware of what is at stake here, and have set up primary health care (PHC) centres in villages and neighbourhoods. These PHC centres depend on the active participation of the entire village community and on the training of volunteer health agents, supervised by a staff of nurses, and sometimes of doctors. In Bangladesh, PHC centres have been in existence at the Savar people's health centre since 1981, with massive mobilization of the population for the promotion of community health. In 1985, the infantile mortality rate there was 85 per thousand, while it was still as high as 124 per thousand for the country as a whole. In Pakistan, the creation of community health centres was followed by the development of mother/child health centres : in 5 years, infantile mortality dropped from 100 to 80 per thousand (1987). PHC centres do not solve all of the problems raised by perinatal mortality, of course, but they do have the enormous merit of being accessible to all, and to depend on personal motivation. Mothers are the first health agents for their children : it is up to society and to the health agencies to determine ways in which community resources may be mobilized to provide the support needed by mothers for the protection of their children's health.

The purpose of this issue of Children in the Tropics is to analyse the keys, the means of protecting the health of newborn infants everywhere, irrespective of their standard of living, at all health care levels, taking into consideration the most rudimentary of health situations. We also attempt to "go further", of course, to use second and third-line reference centres, which are definitely necessary when primary prevention fails, in order to give every possible chance to this little visitor, this human child, so that after coming into the world, he or she may enter the human community.

A constant effort is made here to reconcile health and medical necessities and the emotional needs of newborns, and more specially their relationship with their mother, with whom they should remain as much as possible, if not all of the time.

RECEPTION OF THE NORMAL NEWBORN

by Christiane HURAUX-RENDU

Unless otherwise specified, the situation described involves a local, district or borough maternity hospital, with a modicum of nursing staff and equipment.

BIRTH IN A MATERNITY

The arrival of a newborn baby is a time of intense emotion and joy for the family, and the health personnel should be careful to remain in the background, but still present to protect both mother and baby. This is often the greatest difficulty in deliveries in specialized establishments.

During delivery, there is theoretically enough time to make sure that everything has gone normally and that there is no special medical history, and also to check the equipment required for early care : stethoscope, probe and equipment for aspiration, source of heat, clean linen, sterile compresses, disinfectant, sterile instruments for cutting the cord, scale, measuring rod, tape measure.

It is also preferable to have a manual artificial respirator at hand, as well as a source of oxygen. Last, medication such as a suspension of vitamin K for oral intake or injection, and an ocular disinfectant (ointment or eyedrops) should be kept refrigerated. Strict hygiene must be constantly respected. The equipment required for the resuscitation of newborns is described in the chapter on neonatal depression, but every object must of course be prepared and maintained in working order in maternities to which pathological neonates may be referred.

EARLY CARE

Immediately after birth, the newborn is placed on the mother's belly, where he/she is dried and the nasopharyngeal passages are cleared in a non-traumatic, non-contaminating manner, by nose-blowing and aspiration. Vitality is assessed by a rapid examination of the vital functions, expressed by the APGAR score (cf. table 2), measured at one minute after expulsion, then at three, five and ten minutes. When the child is perfectly well (breathing regular, not noisy, lilac pink skin colour, regular heartbeat), he/she may be left for a while on the mother's belly, with some protection against catching cold (heating lamp or a warm, dry cloth). The burrowing reflex, particularly evident at this point, will probably lead him/her to seek out the breast, and begin to suckle.

In any case, some routine procedures should be performed immediately if there are any doubts as to the satisfactory vitality of the newborn, or later on, once mother and baby have begun to get to know each other, through their first interactions :

— verification of the choanae, the oesophagus (using the syringe test if any doubt remains), and the anus ;

Table 2
THE APGAR SCORE

	0	1	2	at 1 min	at 3 min	at 5 min
Heart	absent	< 100	> 100			
Breathing	absent	hypo-ventilation weak cry	good, vigorous cry			
Tone	flaccid	slight flexion of the limbs	good flexion			
Reflexes (stimulation)	no response	slight movement	crying			
Colour	blue or white	body pink, extremities cyanosed	all pink			

— perfunctory medical examination to detect any anomaly requiring emergency therapeutic attention : cardial and pulmonary auscultation, abdominal palpation, examination of the hips and of the neurological status ;

— care for the umbilical cord : disinfection of the cord and of its base, using iodized alcohol, clamping using a sterile field or a rubber ring made of 2 mm-thick portions cut out of a flexible tube with a 5 mm diameter, and sterilized in an autoclave (1).

The cord is cut with sterilized scissors (or the sterilized blade of a scalpel). The cut surface is disinfected using iodized alcohol and dried. No dressing is required or is it desirable, since drying is more satisfactory when the circulation of air is not impeded by a dressing. The umbilical arteries are counted ;

Vitamine K1

— administration of vitamin K1, either by an intramuscular injection of 5 mg., or orally : three to five drops, on three consecutive days ;

Disinfect the eyes

— disinfection of the eyes, using antiseptic eyedrops containing 1 % silver nitrate, which should not be allowed to evaporate, or antibiotic ointment or eyedrops, containing 0.5 % erythromycin or 1 % tetracycline, effective against chlamydia infections, but expensive ;

(1) A. BRIEND, I. de SCHAMPHELAIRE. Ligature et soins du cordon ombilical. In : Développement et Santé, n° 66, pp 19-21, 1986.

Weight

— measurements : weight, height and head circumference. The standards for weight, height and head circumference cannot be transposed from one ethnic group to another. More specifically, western standards cannot be applied to babies born to mothers whose genetic heritage, health and nutritional status and living conditions are completely different. The average birth weight of African newborns seems to be 200 to 300 grams lower than that of western babies, and it seems preferable to consider weights ranging from 2,750 to 4,000 grams as acceptable for at-term newborns. It seems necessary for the main centres to determine references for weight as well as for height and head circumference to be used for each pregnancy brought to term with no pathology, so as to obtain a better picture of the small proportion of newborns located outside of the norms, either too heavy (that is, weighing over 4,000 grams) or above all, too light (that is, weighing less than 2,500 grams), who require special surveillance (Cf. chapter on fragile newborns). For height, the range is between 47 and 52 cm

Height

Head circumference

and head circumference ranges from 33 to 36 cm. A study has been conducted in Tokombéré (Cameroon) on a somewhat small number of children (490 live newborns) ; it shows that 35.1 % of these children have a birth weight comprised between 2,500 and 3,000 grams. Within this group, 3.6 % were premature (10 born at 7 months, with an average weight of 1,552 g and 10 at 8 months, average weight 2,238 g) (figure 1).

— next, an identification bracelet showing the child's name, sex, date and hour of birth, written with a ball-point pen (water-resistant) is put on the child's arm and properly adjusted ;

Washing

— the baby should be washed, to rid him/her of any trace of dried blood. Special attention should be given to the gentle cleansing of the scalp, by lightly scrubbing it with soap and the hands or a soft brush. Removal of the vernix caseosa which protects the child's skin is neither necessary nor desirable : it disappears spontaneously. The baby should be rinsed with clean, warm water, then completely dried and dressed. Bathing of the baby immediately after birth is quite feasible when nothing is wrong and if the parents so desire. The bath may provide a good opportunity for relaxed gaining of mutual acquaintance between parents and baby ; it is only mea-

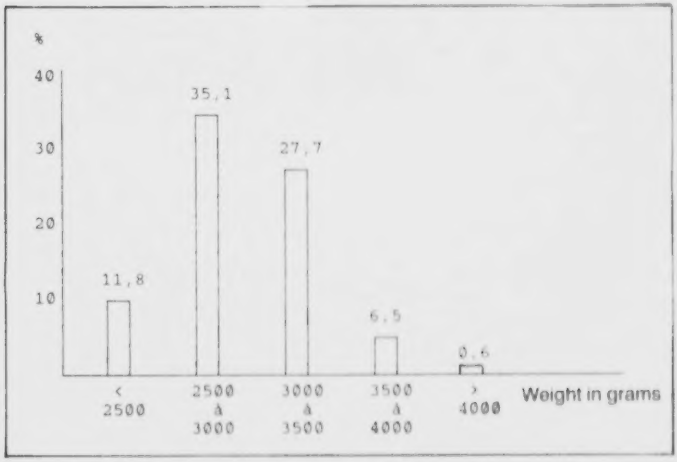

Figure 1 : Distribution of birth weights of 490 live newborns in Tokombéré, 1982.

ningful if it is given by the parents, with the help of the staff, but is not absolutely necessary for the establishment of good parent-child relations. All of these acts are extremely important, and should be recorded on the newborn's surveillance sheet or record along with the events occurring during the first hours : emission of urine or meconium, behaviour, first feed.

Surveillance record

During the first hours of life, the newborn should be kept under discrete surveillance, while development of the mother-child relationship through constant contact is encouraged : the baby, dressed, is placed in a cot alongside of the mother, but allowed to suckle or to be in physical contact with the mother as often as she finds acceptable. During this first period the mother should be helped and encouraged, especially if she is tired, or has never given birth before. Many mothers believe that breast-feeding is not advisable during the first forty-eight hours, since they think that the milk is inadequate, too thin, not very nourishing or even harmful. This erroneous belief about "bad milk" is found in many traditional societies. It is important that the mother and the family be adequately informed of the irreplaceable quality of colostrum, which is twenty times richer than mature milk in secretory IgA (the antibodies that cover the surface of the intestine and contribute to immune defences) and in free amino acids, with a low lipid content that makes it particularly easy to digest.

THE FIRST MEDICAL EXAMINATION

This is an important time for getting to know the newborn. It completes the very first examination conducted at birth, which aimed essentially at checking the child's vitality and initial satisfactory adaptation. The objective of this complete examination is more all-encompassing ; when completed, it should determine whether both the newborn's behaviour and his/her history are normal, or the existence of any special risk factors possibly requiring surveillance or appropriate care.

The newborn, it should be remembered, already has a long history, an intrauterine and family history, the outstanding physiological and pathological facts of which should be uncovered.

Family history

First, the story of the family, with the number of previously born children, the parent's age and occupation, their way of life (housing conditions, presence of the extended family, number of wives...) provides information that helps situate the child within the family and some indication of whether the mother will receive help and support when she returns home.

Family medical history

Useful information on the medical history of the family includes knowledge of any case of tuberculosis or hepatitis, or of anaemia in either parent or in another child, which might be indicative of a blood disease. Other hereditary conditions such as metabolic diseases, malformations and developmental anomalies in earlier children should also be considered.

Mother

It is important to determine whether the mother has high blood pressure, heart disease or asthma, and whether she is a substance abuser (alcohol, tobacco or drugs). Her nutritional status should be determined. Any of these may be a reason for special surveillance of the baby. If the blood group of the parents, and of the mother in

particular, is known, a risk of blood incompatibility if the mother is rhesus-negative and/or of the O blood group may be detected. When blood testing was performed during the pregnancy, some maternal findings may be useful : detection of syphilis (quite difficult to interpret in countries where treponematosis is endemic), checking to be sure that toxoplasmosis and rubella tests are not positive at the end of pregnancy if the woman was negative previously ; blood tests for hepatitis B are valuable in countries where it is endemic, with a view to prevention of neonatal infection ; such prevention is unfortunately impossible where AIDS is concerned.

Pregnancy

The course of the pregnancy, or at least its main points, should be determined : existence of an infection possibly transmitted to the newborn in utero or during delivery, bout of malaria, infestation with a parasite, threat of premature delivery, toxaemia of pregnancy or bleeding. The exact term of the pregnancy is checked, as well as whether it coincides with the mother's prediction.

Delivery

Last, information is obtained on the conditions of delivery : when rupture of the membranes occurred, total duration of labour, existence of fever or of local signs of infection, colour of the amniotic fluid, type of delivery and presentation, appearance of the placenta : any signs of infection (micro-abscess), calcification, apparent infiltration, number of umbilical vessels (the absence of any umbilical artery is a sign of a possible urogenital malformation).

12 *Record*

All of these facts should be noted in a dossier that will follow the mother and the child, and in which the child's status at birth and everything that was done before then is recorded, so that a continuity is established between the antenatal period and postnatal life.

Satisfactory material conditions are required for the examination of a newborn : it should take place in the mother's room, sufficiently heated and well-lit, with both parents present when feasible. The child is examined between two feeds when possible, so that he/she is neither too hungry nor too sleepy, handled gently with warm hands, and spoken to, to avoid crying. The examination is conducted systematically using a conventional protocol, and commented and explained to the parents. The findings are recorded in the dossier.

Overall assessment

While undressing the baby, his/her reactions are noted and attention is sought. When awake and calm, the child is attentive, with a bright and unclouded gaze, and when spoken to he/she briefly focuses on the speaker's face. Note is taken of the position taken spontaneously, which is indicative of the intrauterine position, skin colour at rest, whether breathing is calm and regular, and trophicity, as judged by the general bearing and the appearance of the skin.

Examination of the skin

Colour

The colour of the skin is assessed on the body. It is usually light pink, or darker if the baby is black. Slight cyanosis of the extremities is not pathological in itself, whereas any peri-buccal or

Texture

peri-mammary cyanosis is indicative of a difficult adjustment to repiration. The texture of the skin is also examined, with the existence of fine collateral vessels on the body, flaking or shredding desquamation of the palms and soles, possible subcutaneous infiltration, which should be moderate in normal newborns. There may be some unusual signs such as a bluish plaque known as a Mongolian spot : it is slate blue, generally located in the sacral area, mostly in dark-skinned individuals, and disappears within 2 to 3 years. Flat facial angiomas usually disappear sooner.

Cardiorespiratory examination

Breathing

At rest, the newborn's breathing is calm, thoracic-abdominal, and regular, with some short, spontaneously resolved pauses. The child breathes through the nose, mouth closed, which is why a bilateral imperforation of the choanae results in severe respiratory distress. Auscultation makes sure the vesicular murmur is symetrical in the two lungs, and that there are no moist rales, which would be indicative of inhalation of amniotic fluid.

Heartbeat

Auscultation also determines the heart rate, which should normally be about 120 beats per minute, occasionally somewhat slower during sleep. Heart sounds are clearcut and while a systolic murmur may be heard very briefly at birth, it should have disappeared within a few hours.

Resuming normal color

The peripheral haemodynamic status is judged not so much by the colour of the skin as by the time required to resume normal colour following brief pressure — no more than 3 seconds — on the body. Deep haemodynamic status is evaluated by palpation of the peripheral arterial pulses : the radial arteries, and above all the femoral arteries, which has the added value of eliminating the possibility of aortic coarctation (stenosis of the aorta). Measurement of blood pressure does not provide any useful information when the satisfactory haemodynamic adjustment of the newborn has already been determined.

Peripheral pulses

Examination of the trunk and abdomen

Breasts

The breasts may be swollen, and some drops of milk may be secreted in both boys and girls. It is important to avoid pressing them ; this physiological trait disappears spontaneously, and is a part of the genital crisis of birth.

Abdomen

The abdomen is soft, occasionally somewhat distended following a feed, and intestinal loops are visible the skin. There is occasionally non-pathological diastasis (or hernia) of the rectus abdominis, or an umbilical hernia, more frequent in black children, both or which regress spontaneously within some weeks or months, depending on their extent. The state of the umbilical cord is checked ; it should be perfectly clean and dry, with no effusion or moisture. The mother is given explanations as to the need to keep the cord perfectly clean until it is shed, 8 to 10 days later, and to refrain from placing any traditional substance on the cord or on the navel thereafter.

The abdomen is palpated to make sure the wall is pliable ; the liver and spleen may sometimes be felt through the ribs. If the liver is excessively prominent — jutting out more than 2 cm — a patholo-

gical state such as neonatal infection (in which case the spleen is also enlarged), jaundice or heart failure should be suspected.

The lumbar fossae are also palpated, but normally the kidneys are not felt. If they are, the child should be reexamined a few days later and diuresis monitored, since there may be an urinary malformation, which must be detected.

Genitalia

The external genitalia are carefully examined. In boys, the two testicles are palpated. They are often found in the upper inguinal canal, or even within the abdomen if the palpation is a bit too abrupt. The absence of one or both testicles upon palpation on several subsequent days is a sign of uni or bilateral cryptorchidism. The volume of the bursa may be swollen by a hydrocele of the tunica vaginalis, which will regress spontaneously within months. The lower part of the penis is carefully unrolled, and the normal opening of the urethra sought (to eliminate the possibility of hypospadias). The prepuce totally or partially covers the glans, and it is preferable not to move it, since preputial adhesions are frequent and benign.

In girls, the labia majora are separated, leaving the vulva visible, and the vagina inspected. There are often mucous filaments under the hymen. Vaginal secretions are quite frequent, and are not indicative of pathology : they are whitish, and slight bleeding, a part of the "genital crisis", may even occur in some cases. The mother should be informed of its normal, physiological character.

Last, the perineum is examined, as well as the anal margin, which should be properly striated, and the sacrococcygeal region, in which the fossette is located, and the eventuality of its prolongation by a fistulous tract eliminated. No meconium should be present beyond the 36th hour. Sexual ambiguity is extremely rare, but should be rapidly identified, for exploration and management, and notification of the child's gender is delayed.

Examination of the head and neck

Skull

The shape of the skull may have been deformed during labour. The fontanels are palpated (the width of the anterior fontanel is extremely variable, ranging from 0.5 to 6 cm). The sutures may still overlap shortly after birth, or be somewhat disjoined. Occasionally an occipital craniotabes is observed, especially in black babies. A serosanguineous bump (infiltration of the subcutaneous tissues) may occur at the point of presentation ; it disappears within hours.

Later, a cephalhaematoma may develop. This is a subperiostal swelling filled with blood, confined within the sutures of the parietal lobe, where it is most often encountered. This is a common consequence of the moulding of the cranial bones during delivery. It disappears within one to two weeks, spontaneously, and may accentuate physiological jaundice (by resorption of the blood). It must absolutely not be punctured, even if it is large, since that would be not only useless but dangerous (there is a risk of infection).

Face

The face is observed : it may be asymmetrical, owing to its intrauterine position, sometimes with an apparent torticollis ; this

should be differentiated from true, traumatic torticollis, caused by elongation of the sternocleidomastoid muscle, which develops secondarily, and in which a swelling indicative of a muscular haematoma becomes palpable somewhat later.

Mouth

The mouth is thoroughly inspected to detect any cleft palate, which may be located in the extreme posterior portion, and generally does not disturb feeding, especially breast-feeding.

Eyes

Examination of the eyes may be complicated by conjunctival oedema, often occurring in reaction to ocular disinfection at birth. One should never forcibly open a newborn's eyes, but should wait until he/she opens them spontaneously, while talking to the baby and allowing him/her to suckle. Small flame-like haematomas are sometimes present on the conjunctiva ; they are linked to birth and disappear spontaneously. The examiner notes the size of the iris, makes sure there is no cataract, records the size of the slit between the eyelids and the space separating them, and checks for the existence of any microphthalmia. The symmetry and attachment of the ears, their cartilage and the shape of the pavilion are checked. The nose may be flattened, sometimes asymetrical because of a deviation of the septum during birth. Facial dysmorphism may be seen : if it is not familial, other anomalies (chromosome anomalies, foetal alcoholism, etc.) should be sought.

Ears

Nose

Flat angiomas may be seen, mostly on the face, eyelids and forehead. They gradually fade, are revived by crying, and disappear within a year.

Examination of the bones and joints

The four limbs are examined one after the other, noting any malformations connected with the intrauterine position. If there is no pain when they are moved spontaneously or palpated, there is presumably no fracture.

Arms

The two arms are checked for symetry of movement, expecially in abduction, since a reduced amplitude or inability to perform this movement is a sign of paralysis of the brachial plexus following elongation or tearing out during delivery of the anterior shoulder. Such paralysis is seen essentially in large babies or in case of dystocia. It may regress spontaneously if caused by simple elongation, and then requires mobilization to avoid retraction, but if the roots have been torn out at the medullar level no spontaneous recovery can be expected.

Hips

The hips are carefully inspected for dislocation or instability, using Ortolani's manoeuvre completed by Barlow's manoeuvre : one hand holds the pelvis steady, between the pubis and the coccyx, while the other seizes the thigh, with the palm of the hand, thumb on the inner side, fingers on the great trochanter. The thigh is then forced into a conventional abduction-adduction (1) movement, followed by a 90 rotation of the thigh by a pronosupination movement of the "femoral" hand in an attempt to move the femoral head backward and forward (figure 2). Any indication, even visible or audible, of a rise means that the femoral head has left its socket.

(1) Abduction : going from the axis outward.
Adduction : going inward from outside.

Congenital dislocation of the hip requires treatment immediately after birth, by binding the leg in abduction position, using two splints, and this should be adequately explained to the mother, since recovery depends on the quality of this immobilization.

Extremities

The extremities of the limbs should also be examined for the presence of any extra fingers or toes. Before ligating these when their pedicle is thin, the parents should be consulted, since they may prefer not to have them removed. Webbed fingers or toes, or overlapping toes, may also be observed.

The position of the hands and especially of the feet is then examined. The ankles are normally straight, with the internal edges of the feet parallel when viewed from underneath, the thighs flexed on the pelvis. Some intrauterine constraints may cause malpositions, the most frequent of which are varus foot, where the soles are turned inward toward the midline of the trunk. This deformity may be reduced by manipulation, and disappears if the external edges of the feet are stimulated by the mother whenever she finds an opportunity (washing, changing diapers...). The same is not true for the other malpositions : talipes vagus may be corrected by mobilization, equinovarus club foot cannot be corrected. Both require appropriate physiotherapy.

Clavicles

The collarbones are inspected for a common fracture, repair of which is spontaneous, forming a callus, which also disappears spontaneously. Parents are usually very concerned about this type of fracture, particularly since it is not treated : the examiner must patiently explain that recovery is spontaneous, with no complications, and above all, that their baby – whom they no longer dare touch – does not experience pain when moved.

The spinal column is also checked, to make sure there is no discontinuity, particularly in the lumbar-sacral region, or deformity suggestive of a hemivertebra.

Figure 2 : Barlow's manoeuvre
Source : A. LACROIX-COUTRY In : C. FRANCOUAL, J. BOUILLIE, C. HURAUX-RENDU et al, Pédiatrie en maternité, Paris, Flammarion Médecine-Sciences, 1989, p. 369.

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Neurological examination

The physical examination of the child yields a first impression of the newborn's behaviour, degree of alertness and ability to communicate ; these are all essential elements which should be recorded and explained to the mother.

Passive tone

Passive tone is judged by the spontaneous flexed position of the four limbs, and the various angles attained by passive mobilization. These angles are habitually acute, indicating the moderate hypertonicity of the normal newborn. Each segment should be examined for asymmetry.

Active tone

Active tone requires the child's participation : contraction of the flexors and extensors of the neck, to hold the head up when the baby is pulled to a sitting position, active straightening up from the feet to the neck, straightening of the trunk. Clearly this cannot be obtained if the child is not wide awake, and the examination should be repeated once or more than once before asserting that the child has disordered active muscle tone. Testing of archaic reflexes is not very important in at-term neonates : sucking is evident, as is grasping ; automatic walking delights parents, who are amazed to find that their child is already able to walk. Moro's reflex is too brutal, and completely disorganizes the baby, who was often cooperative and trustful until then. Furthermore, it does not provide any information other than in case of asymmetric mobility, which may be discovered otherwise. Testing for it is unnecessary here. Last, the crossed extension reflex confirms the complete myelinization of the spinal cord when adduction of the leg goes beyond the midline following stimulation of the other foot.

Archaic reflexes

Neurological maturation

All of these points contribute to the assessment of the newborn's neurological maturation, an important element which is not necessarily correlated with gestational age, even when the latter is accurately determined. Tables 3 and 4 show responses according to neurological maturity, from gestational age 28 weeks to term, as well as some points in physical maturation.

The meaning of discordance between neurological maturation and gestational age is variable, and sometimes remains mysterious. Retarded maturation in offspring of diabetic mothers and in children with some types of pathology is a known fact, as is the precociousness of small-for-date babies. Much less is known about the advanced neurological maturity of African and Carribean newborns, which definitely does seem to exist, and to represent one to two weeks at term, and three to four weeks in prematures. Only cases in which gestational age is unquestionably known can be validly assessed, of course, and the first thing to do in case of disagreement is to carefully recalculate gestational age, taking care to be discrete and to avoid perfunctorily asserting that the child was conceived at an earlier date than the one claimed, or at a later date if maturation is retarded.

Eyesight

At the end of the examination, the newborn's sensory competency, visible throughout the testing, is recorded. Visual competency involves the ability to catch the mother's or a stranger's eye and to follow it for an instant. Similarly, the newborn turns his/her eyes

and head toward a soft light or a brightly coloured object moved slowly in front of him/her. When the gaze cannot be caught, because the child is tired and sleepy, the examination should be repeated at a better time. It is most important to obtain a positive response, the absence of which is indicative of visual pathology.

Table 3

NEUROLOGICAL MATURATION

		State of consciousness during examination						Date Age
	WEEKS	28	30	32	34	36	38	40
PASSIVE MUSCLE TONE	POSTURE							
	HEEL EAR							
	POLITEAL ANGLE							
	FOOT LEG ANGLE							
	SCARF							
	FOREARM RETURNS TO FLEXED POSITION	0	0	0	slight	inhibited	rapid, not inhibited	
ACTIVE MUSCLE TONE	NECK FLEXORS	0	0	±	head does not go beyond trunk	head falls forward	head held vertically several seconds	head held up + +
	NECK EXTENSORS	0	0	±	+	head falls backward		
	STRAIGHTENING LEGS	0	±	+ temporary	+	+ +	+ + +	
	STRAIGHTENING TRUNK	0	0	0	+ temporary	+	+ +	
ARCHAIC REFLEXES	CARDINAL POINTS	slow, imperfect response		complete, more rapid response	complete, rapid, lasting response			
	MORO	arms extended, hands open		complete reflex with abduction of arms and crying				
	GRASPING	+ fingers	+ arms	+ shoulder and back		child raised above bed		
	CROSSED EXTENSION			abduction	either	abduction		
	WALKING			attempted, on tips of toes	good on tips of toes	excellent premature: toe then heel term: heel then toe		

Table 4
PHYSICAL MATURATION

WEEKS	36	38	40
MAMMARY NODULES	2 mm	4 mm	7 mm
PLANTAR RIDGES	1/3 year	3/5 year	3/3
CARTILAGE OF EARS	0	+	+ +
POST-MATURITY			

Hearing

Auditive competency is more difficult to evidence beyond doubt. Someone (preferably the mother) speaks to the child while keeping his or her face out of sight : the baby turns toward the source of the sound, showing a general orientation reaction. Hearing may also be tested using sounds of varying intensity which either induce an orientation reaction or cause the child to cease his/her activity (if the baby was drinking, for instance) or to start, or even to cry if the noise is too violent.

Taste

Gustative competency is easy to identify by the pleasure taken by the child in drinking milk and the displeasure shown when he/she is given relatively bitter substances (vitamin K, vitamin D,...).

Touch

As for touch and cutaneous perception, they may be assessed when undressing the child, if the examiner's hands are a bit cold and the examination table is hard. The way the baby snuggles into someone's arms, and pushes his/her head into a corner of the cradle, for instance, clearly showing a preference for warm, gentle contact.

In conclusion, health workers in charge of newborns should not be disheartened by the length of this description of how to examine babies. This is a most important time, extremely rich in information, and also in exchanges with the child and with his/her parents, whose presence is indispensable.

Some parents feel quite helpless and ignorant of their child's reactions. They do not necessarily perceive their baby's capabilities, competencies and ability to create bonds, and they are rapidly reassured by an examiner who is able to englobe them in the act of creating a relationship with their baby. Conversely, other parents are very capable of observing their child, and are aware that he/she is transmitting messages. These parents then listen to their child. At the same time, the examiner will have determined beyond doubt that their child is normal, and here too may reassure the family.

To close the examination, a synthesis must be made of all of the information gathered, including the family history, so as to determine whether the child is at-risk or fragile (cf. chapter III), requiring

special monitoring, which must then be programmed. In most cases the conclusion will confirm the initial impression of a healthy at-term newborn, for which there is nothing else to do but accompany his/her satisfactory development.

THE FOLLOWING DAYS

The first week of life is still a delicate period for the child's subsequent development. It is not necessarily spent in the maternity, but at least during the first day, an effort may be made to get breast-feeding to a good start, detect any problems, advise the mother on rules of hygiene, begin vaccinations and perform screening examinations when possible, fill out the health booklet and inform parents of its role as a link between the different health agencies which will see the child.

In many traditions, this period is also used to observe the child, who still retains links with the invisible world at birth. The newborn is a manifestation of a holy spirit, and the parents attempt to identify the protecting ancestor who is reincarnating in their child : they attempt to determine the child's vital strength and character, the physical and moral resemblances which enable them to name him/her. It is this name-giving that introduces the child, once and for all, into human society and his/her own lineage.

BREAST-FEEDING

Breast-feeding is a most important factor for satisfactory development, and sometimes even for the child's survival. It is the duty of health workers to do everything in their power to help mothers, including stimulating and encouraging them, to breast-feed their children. This must of course be started much earlier, during pregnancy and even before it by informing school-age youth properly.

Physiology : a reminder

Colostrum

As we have seen, the colostrum produced during the first three days is extremely rich, contrary to the beliefs of most societies. The adaptative qualities of the mammary gland, which is capable of producing the milk most appropriate to the child's needs at each point in time, must constantly be explained. Mothers are often discouraged by their rather flaccid breasts, which they believe to be empty, and are quite surprised when they see milk come out of them following simple outward pressure on the gland.

It is not always easy to explain the physiology of breast-feeding, with the many hormonal interactions, to parents. The milk-secretion reflex is caused by the prolactine hormone, whereas expulsion is influenced by oxytocin. The mechanisms responsible for triggering mammogenesis (multiplication of the glandular cells and formation of the acini), followed by lactogenesis (differentiation of the cells that then become secretory) develop with pregnancy. Mothers are interested in learning that this process begins well before childbirth. They must understand that thereafter, breast-feeding depends on them only, and on the perseverence with which they put the child to the breast, since suction is the only necessary, sufficient condition for the continued secretion of milk. Figure 3 shows variations in the composition of milk over time, and the respective role of the various components — energy (lactose,

lipids), growth (free amino acids, total proteins), protection (minerals, vitamins, immunoglobulins) — may be explained to parents.

Parents should be aware that breast milk affords protection against infection, through the antibodies produced by the mother, and against malnutrition because it is particularly easy to digest : it never causes any intolerance or diarrhoea. It is ready for use and requires no handling, thus eliminating the risk of erroneous dilution and reducing the risk of infectious gastroenteritis. Last, it is economical and strengthens the bond between mother and child.

Management of breast-feeding

It is important to help the lactating mother, especially if this is her first child. However, care must be taken to make sure that the advice given by different members of the team is coherent and respectful of the mother's personality.

First feed

The baby should be put to the breast as soon as possible after delivery : the mother should be encouraged to do so, since she may be tired, and understandably want to rest. In fact, how well milk comes in is conditioned by how early suckling begins. The newborn is eager to suckle, as we have seen. The burrowing reflex peaks during the first two hours after birth. The mother must simply be helped to hold her baby, to settle herself in the right position, lying on one side with her back supported by one or two cushions ; the baby is also lying on one side, with his/her face right in front of the breast, and should not take just the tip of the nipple, but the entire areola into his/her mouth. A few sucking movements on each breast suffice, and the feed may be very short, or last a bit longer if both mother and child enjoy it. The success of this first feed may be crucial for satisfactory subsequent breast-feeding. For this reason, the presence of an attentive, competent person capable of guiding and reassuring the mother while remaining discrete and respectful of the emotional bonds being established is important.

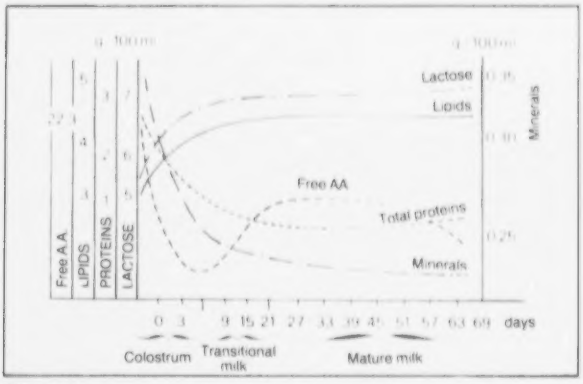

Figure 3 :
Source : M.T. THIRION In :, C. FRANCOUAL, J. BOUILLIE, C. HURAUX-RENDU et al, Pédiatrie en maternité, Paris, Flammarion Médecine-Sciences, 1989, p. 454.

Following feeds

The following feeds should be given as often as the child calls for them, usually about six to eight times a day. It is preferable that they be short (a few minutes) and repeated rather than long and at greater intervals. Their repetition stimulates the onset of lactation, which is stabilized within days. No definite schedule should be set down, and the mother should be guided by her child's needs and rhythm, which change as days go by, and vary from one child to another. Some babies sleep for hours at a time during the first days, while others constantly demand the breast. However, it is preferable to awaken the child every three or four hours, during the day, and to try to give him/her the breast. It is best to put the baby to both breasts at each feed, at first, so as to increase hormonal stimulation (prolactin, oxytocin) and to make sure the breasts are emptied.

Mother's position

The mother's position during breast-feeding is very important : she must be comfortable, and receive back support. There is no one special position, each mother should be helped to find the position, in bed, in which she feels best. What is important is that she be able to hold her infant without tiring, with the baby's head facing the breast.

Topical hygiene

The breasts must be kept perfectly clean, and washed with soap and water every day, before each feed, while the nipples are washed before and after each feed, using boiled water when possible.

The breasts must be empty at the end of each feed ; this enables the normal pursuit of lactation and avoids congestion.

General hygiene

General hygiene is a matter of common sense : the mother should have a healthy, sufficiently abundant diet, rich in proteins and calcium more than anything else, and should avoid smoking and alcoholic beverages. She may drink small amounts of tea and coffee, preferably after a feed. Protection against anaemia (administration of iron and vitamin B6) is strongly advised, as well as antimalarial treatment in places where it is endemic, if it was not already begun during the third trimester of pregnancy. Antalgics may be taken if the "after-pains" are too strong. It is a fact that while these are a natural, useful occurrence, the uterine contractions aroused by suckling, through the secretion of oxytocin, may be a cause of concern, especially if they are very intense, and the mother should be given information and care.

Difficulties encountered in breast-feeding

Delayed onset of lactation

Delayed onset of lactation is one of the most often-encountered difficulties : the child sucks actively, but remains hungry, and the breasts are empty when pressed. Great flexibility is required in handling this situation, so as to avoid suggesting a complementary milk feed, often demanded by the mother. If the baby's weight is satisfactory and he/she is healthy, more frequent breast feeds should be suggested, along with a little boiled, sweetened water : one 7 gr lump for 50 grams of water (a 10 % solution), replaced when possible by maltose (or dextrin-maltose here too, a 10 % solution), to avoid giving fructose. A milk complement is only proposed in case of failure, or if the mother is really too worried, thus further disturbing the breast-feeding process. Regardless of

the nature of the complement (water or milk) a spoon or cup should be preferred, to avoid using a bottle and thus reserve sucking for the breast.

Insufficient milk

Insufficient milk flow during the following days is relatively rare : it tends to exist in mothers' minds more than in reality. Mothers must be taught not to confuse the newborn's constant sucking activity (when a finger is put in his/her mouth, contact between objects or his/her own hands and the mouth) with hunger. These are reflex motions, and are much more active in breast-fed children irrespective of their appetite.

Occasionally milk secretion actually is insufficient, however. This is seen by the absence of a weight increment at the third or fourth-day weighing, by the child's agitation and tendency to want the breast again less than one hour after a feed. Weighing the baby before and after suckling may clarify the diagnosis : this should not be done systematically, since it contributes to the mother's anguish, and it is preferable that she learn to detect her child's real needs by observing his/her behaviour. If her milk really is insufficient, a cup-fed complement of infant formula, given immediately after the child has taken the breast, should be suggested. In this case, careful explanation of how to prepare the milk, the strict sanitary conditions surrounding its preparation and the need to sterilize the containers used for preparation, is required. Often enrichment of the mother's normal diet, along with the return home in a satisfactory emotional climate and family context improve the milk flow, as evidenced by the fact that the child no longer demands a complement. This eventuality should be adequately explained to the mother, so that she will not systematically oblige her child to drink the extra milk, which may decrease his/her appetite for the following feed.

Crevassed

Crevassed nipples are unfortunately excessively frequent : since they are very painful, they often put an end to breast-feeding, or cause unnecessary difficulties. The best treatment is preventive : the nipples should be kept dry between feeds (avoid swathing them in cotton, which retains moisture), they should be kept very clean, feeds should be short, and the child's position correct. If a crevass does develop, it should be treated quickly, before bleeding occurs. This means that nipples should be inspected daily, and mothers informed so that they report any pains that persist beyond the first two or three sucking movements. Treatment then involves strict disinfection, the interposing of a sterile "artificial nipple", application of a soothing vitamin A ointment. If only one breast is crevassed, the child should be put to it less often, and the excess milk pressed out by hand. If both breasts are crevassed, the child is only put to one of them at each feed. Recovery is achieved more rapidly if the breasts are left uncovered.

Mammary congestion

Mammary congestion is the result of insufficient emptying of the breasts for one of a number of reasons : the child does not suck enough, crevasses make nursing painful, or milk secretion is overabundant. Here again, the best treatment is prevention : make sure the breasts are empty after each feed, and press out any

surplus milk, placing it in a sterile container for later use. If the breasts are congested (hard, tense and slightly painful), hand pressure should be preferred to a milking machine. The milk will flow out more easily if towels soaked in warm water are applied to the breasts, or a hot shower is taken.

The manual expression technique should be carefully shown to mothers. The whole breast is seized at its base with the palm of the hand, and emptied by sliding all five fingers toward the nipple, constantly changing the points pressed. Limiting oneself to pressure that is superficial, or starts too close to the nipple is not only inefficient, but painful. Once the congestion is relieved, if the milk secretion is really abundant and exceeds the child's needs, it may be suggested that the mother collect her excess milk -sterilely, of course- after each feed. A manual or even an electric milking machine may then be valuable. The milk should be given to the local milk bank, if there is one.

It is not advisable for a newborn to be directly given breast milk that does not come from his or her own mother. Ideally, this milk should be sterilized to avoid any risk of contagion, especially by viruses such as hepatitis B, CMV or HIV. However, in some isolated maternities where premature or very small-for-date babies cannot be given their mother's milk, it may be a pity to deprive them of this particularly good nourishment, and it is up to the physician to evaluate the risks in each specific case.

Abscess

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Abscesses of the breast are quite exceptional ; they are the result of improper hygiene, and suckling of the affected breast should be proscribed. The mother must be put on antibiotics, and a surgical drain may be required. The baby may be put to the other breast, since most of the antibiotics used for this do not affect the infant, and the infection is purely local. The main drugs contraindicated during breast-feeding are listed in table 5.

Table 5
DRUGS CONTRAINDICATED DURING BREAST-FEEDING

Allergens	Danazol	Phenacetin
Amiodarone	Derivatives of ergot	Phenolphthalein
Anticoagulants, oral	of rye	in chemical
Antidiabetics, oral	(except for brief	laxatives
Antineoplastic agents	use of Methergin)	Phenylbutazone
Atropine	Ethanol	Radioactive
Bromures	Indomethacin	elements
Chloramphenicol	Iodine	Reserpine
and derivatives	Lithium	Sulfamides
Chlorthalidone	Meprobamate and	Tetracyclines
Cholchicine	derivatives	Thyroid
Cholecalciferol and	Narcotics	antagonists,
dihydrotachysterol,	Nicotine	synthetic
large doses	(large doses)	
Cyproterone	Novobiocin	

Taken from FRANCOUAL C., BOUILLIE J., HURAUX-RENDU C. et al, Pédiatrie en maternité, Paris, Flammarion Médecine-Sciences, 1989, p. 478.

Contraindications

There are few medical contraindications to breast-feeding, and these involve problems entailing serious risks of contagion for the newborn, or a danger for the mother's health. Each situation should be studied thoroughly, and the respective risks weighed at length, including the eventual difficulty in handling formula feeding properly, depending on the family's material and socioeconomic living conditions.

Those maternal diseases in which breast-feeding should be ruled out are : bacillary pulmonary tuberculosis at the time of delivery (if active treatment has been under way for at least 1 month, breast-feeding is possible), severe, decompensated heart disease, severe psychiatric conditions. When the mother is infected with HIV (the AIDS virus), breast-feeding is theoretically undesirable, since there is some indication that the virus is capable of crossing into the milk and infecting the child. However, in those countries where breast-feeding is a cardinal element in the child's survival, the hypothetical risk of contamination does not seem to legitimate this contraindication. For mothers who are chronic carriers of the hepatitis B virus (HBV), breast-feeding should not be excluded either, since the antiviral antibodies cross into the milk. However, for the latter two ailments (HIV and HBV), the child runs a real risk of contamination, at birth or afterward, irrespective of breast-feeding (see further down).

Formula feeding

In countries with insufficient sanitary and socioeconomic facilities, artificial feeding represents a definite risk for newborns. It should only be used when there are serious reasons to do so, and every effort should be made to provide adequate information to mothers who do not want to nurse, while respecting their decision if it seems to have been thought out. The type of milk chosen is unimportant : it may be sweetened with lactose in a special infant formula or adapted intermediate sweetener milk ; the formulas are increasingly similar, and emphasis tends to be placed on the calcium/phosphorus ratio, which is optimal at 2, the quality of the proteins and their eventual pre-hydrolysis, as well as the nature of the lipids, with inclusion of medium-chain triglycerides. In fact, the choice of a milk often depends on what is available locally.

The crucial point is that mothers learn how to manage this type of feeding : preparation of the bottle, proper dilution, sterilization (by heat or cold, the latter being much more expensive), cleansing of the bottle and nipple immediately after use, protection of utensils and products against flies, use of boiled water, etc... Emphasis must constantly be placed on these innumerable precautions. It is absolutely necessary that the mother prepare her child's bottles personally during her stay at the maternity, under the watchful eyes of the personnel, who will be sure to give her the necessary advice on how to adapt these rules of hygiene to her own living conditions, once she has returned home. The mother will also be told about the seriousness of diarrhoea, the need to give her child water in that case, and the urgency of bringing him or her to a consultation. Infant gastroenteritis rapidly leads to severe dehydration, whereas if it is caught in time these children will recover, with the help of appropriate oral rehydration.

HYGIENE

Washing

Newborns should be washed completely every day, and their entire body, including the head, soaped (using a neutral or slightly acid soap, with no added perfume). Rinsing is done either in a washbowl or simply under the shower, using warm water. Drying is very important, and the flexion folds should be carefully dried to avoid any maceration. This washing absolutely must be done in the mother's presence, then very rapidly by the mother herself, aided by the advice of the personnel if necessary. The mother may complete the wash-up by a body massage using a clean oil (sweet almond oil or any oil used traditionally).

The face should be washed carefully with a clean piece of cotton or cloth for each orifice : nostrils, ears, and each eye, using boiled water. This care for the eyes is particularly important, since newborns frequently develop conjunctivitis, for which early treatment is necessary. Purulent neonatal ophthalmia due to gonorrhoeal infection is rare now, with routine prevention at birth, but chlamydia infections have become frequent. In areas where trachoma is endemic, great care must be taken at all times, and mothers must be taught to be very strict about hygiene when washing their baby, but also in everyday matters : handwashing, protecting water reservoirs, preventing flies from touching the baby. In case of conjunctivitis, it seems wise to administer rifamycin eyedrops (1 or 2 drops, 6 to 8 times a day) in endemic areas, even if no bacteriological assay is feasible.

The cord is carefully dried and a disinfectant such as a 2 % aqueous eosine solution is applied.

Clothing

The newborn is dressed in clean, dry clothing, more or less heavily depending on the room temperature ; heavily enough as to not expend his/her own energy to produce the needed calories (which babies do poorly and at great cost), not too heavily, to avoid perspiration and dehydration. Clothing should be adapted to each case. The baby should be comfortable and able to move freely. Linen used for the child should be washed whenever it is dirty, using a neutral soap, well rinsed and dried in the sun if possible or using a hot iron. Diapers may be made out of extremely soft old linen ; disposable diapers are definitely very practical, but they are terribly dear and not very recommendable.

During the day, the child should be changed practically at every feed, especially once the period of elimination of the meconium is over. Breast-fed newborns occasionally have liquid, lumpy, faeces, particularly acid if the mother eats much citrus fruit or drinks fruit juices, and these may irritate the baby's buttocks if diapers are not changed often. The buttocks should be washed with soap and water and dried carefully after each defecation. In case of irritation it is preferable to air the baby's bottom, and to apply 2 % aqueous eosine following each washing. This hastens drying up and is a mild disinfectant.

As seen, the mother may learn the basic rules of hygiene that are so important for her child's satisfactory development during her stay in the maternity. These include hygiene for the child, hygiene for the mother herself, hygiene for those around them, who should

participate by washing their hands before holding the baby, help in washing linen, protect the child and the immediate surroundings against contact with flies, mosquitoes and animals. Children with colds or other illnesses should not be allowed to go near the newborn.

MINOR ANOMALIES

During the first week, some difficulties may occur. These are often minor, but cause concern to the mother, often rightly so since they require appropriate management to avoid the development of a more serious condition.

Jaundice

Jaundice is very frequent : it is said to be physiological, caused by immaturity of hepatic glycuronyl transferase. Since it is not always easy to detect on the skin of Asian or black children, its intensity should be assessed by examination of the conjunctiva. It occurs toward the second or third day. The colour of the urine should be noted, since staining of diapers is a sign of a satisfactory capacity to break down bilirubin and to eliminate it through the urine. If jaundice is intense, the baby should be placed, naked, under a sunlight or in a sunny room, but never with the sun's rays directly on the child's skin, of course. This "natural" phototherapy is often effective in tropical countries. The absence of enlargement of the liver and spleen, of anaemia or of any other associated sign indicative of evolution toward a pathological condition such as neonatal infection, foetomaternal incompatibility of the rhesus or ABO blood system, glucose-6-phosphate-dehydrogenose deficiency (especially in boys) should of course be checked.

When assay of total serum bilirubin is feasible, it facilitates monitoring of the course of jaundice, so that it may be kept within the acceptable range of 200 to 300 micromoles per liter (150 to 180 mg).

Diarrhoea

Feeding difficulties may be of several types. First, there is diarrhoea which, as seen above, is not serious in breast-fed infants but potentially very risky in formula-fed babies. True diarrhoea is defined by frequent defecation (ten or more times a day) with spurts of liquid, frothy, acid faeces. It occurs frequently during the first days of free feeding, at demand, in voracious babies, and is probably linked with intestinal transformation of milk. The weight curve may level off somewhat, indicating dehydration, which sets in early but remains clinically silent at first.

Treatment is based essentially on very early oral rehydration using WHO-type oral rehydration salts. In breast-fed children, the rehydration solution may be given in addition to breast milk, in small amounts, very frequently. If the child is fed a milk formula, this should be interrupted for a few days, and the rehydration solution given exclusively for 48 to 72 hours, followed by very gradual reintroduction of milk : sweetened milk should be preferred to dextrin maltose. In some cases, the origin of diarrhoea is bacterial (enteropathogenic colibacilli or even salmonella), and more often viral (coronavirus, rotavirus), as evidenced by the occurrence of minor epidemics. This eventuality explains the absolute need to reinforce hygiene if diarrhoea occurs in the maternity unit.

Constipation

Constipation is much more frequent and commonplace, but it too worries mothers. The usual case of infrequent defecation — every two or three days — is actually no matter of concern in breast-fed infants.

In bottle-fed babies, the milk dilution should be checked, and fruit juice given. True constipation, with rare, painful discharge of hardened marble-like faeces may be indicative of a congenital megacolon, especially if it alternates with bouts of diarrhoea.

Regurgitation

Regurgitation frequently accompanies burping following suckling. There may just be a bit of spew, or more abundant vomiting, which requires attention since it may be an indication of gastro-oesophageal reflux, with an attendant risk of rapid development of oesophagitis. The child turns red, cries and seems to be in pain after feeding. This acid reflux in the oesophagus is caused by a chalasia of the cardial sphincter or cardio-tuberous malposition. Treatment should be undertaken immediately if several feeds are regurgitated, or even if painful episodes occur with no discharge.

The first thing to do is orthostatism, permanently placing the child in a sufficiently inclined position, often lying on his/her stomach. This requires that the cradle be arranged so that the baby does not slide down to the bottom and is maintained in a proper position. An attempt may be made to divide feeds, and to add thickeners (gulmik, gelopectose) if the child is formula-fed. Split doses of antispasmodics are given 10 minutes before feeds (primperan (R), 10 drops/k/day, Motilium (R), one-half measuring spoon/k/d) ; last, a preventive antacid such as phosphalugel (R) is given for the oesophagitis after the feed. In case of true reflux the treatment is continued for several months.

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Haemorrhage

Bleeding may be a sign of vitamin K deficiency : it may involve the cut cord, the skin and mucous membranes, or the upper or lower digestive tract. When a breast-fed baby spits out red blood, the possibility that he/she has swallowed blood from a crevassed breast should first be eliminated. Other types of bleeding are less frequent in these children. This syndrome occurs toward the second or third day, and requires intravenous injection of 5 to 10 mg of vitamin K. Vitamin K deficiency is accentuated by the mother's intake of anti-epileptic agents or of rifamycin (R) during pregnancy. Routine administration of vitamin K at birth has considerably decreased the frequency of this deficiency. If bleeding is extensive or prolonged, complementary examinations are necessary to assess the degree of anaemia and to refine the diagnosis (including detection of maternally induced thrombopenia).

SCREENING TESTS - IMMUNIZATION

Some further preventive action is required before the newborn is allowed to go home with his or her mother. In fact, this is dependent on the available laboratory infrastructure, which determines the feasibility of the many screening tests that may be done at birth.

Screening tests

Some tests actually do not require any sophisticated equipment or specialized laboratory : these are tests for the evaluation of

sensory competency such as vision and hearing, described in the neurological examination. It is more complicated to organize screening for hereditary or congenital diseases such as hyperthyroidism (1 out of 5,000 births in the Antilles, much less frequent in Africans), phenylketonuria, which is infrequent, and above all haemoglobin abnormalities (sickle cell disease in blacks, thalassaemia in Asians).

Early detection of homozygous sickle cell disease is important, so that family management, health education and preventive treatment of infections (vaccines, penicillin) may be begun at an early date. Similarly, the prognosis for congenital hyperthyroidism has totally changed in countries where screening is routinely performed at birth. Mothers should also be tested for acute and chronic communicable diseases, when there is a risk of contamination for the child : early treatment of toxoplasmosis is required if the newborn has specific IgM, serovaccination must be performed at birth in case of maternal hepatitis B, signs of congenital infection should be sought in case of maternal syphilis, and treated using penicillin. It is up to each country to set up priorities for screening as well as for prevention.

Vaccines

Vaccines to be routinely given at birth definitely include the BCG in those countries where the general level of hygiene is still low, to avoid at least the severe forms of primary tuberculosis infection (meningitis) before age one.

It is preferable that hepatitis B vaccine be available and proposed for babies born to mothers with the HBs antigen, and a fortiori the HBe : this implies that screening of mothers is feasible.

Last, immunization against tetanus at birth is a good idea, especially if the mother was not vaccinated during pregnancy. In at-risk areas, the prevention of rickets and of some avitaminoses or deficiencies should be considered, in accordance with living conditions.

Every screening test and every condition treated at the maternity, the information collected on the child's neurosensory and physical behaviour during the stay at the maternity should be recorded in the health booklet, along with the anthropometric measurements and family history.

It is important that parents be aware of the confidential, medical nature of this booklet, which should be shown to the doctor or child nurse at each visit, but not to just anyone. This booklet will follow the child as he or she grows, and will be further enriched by the remarks of various doctors and nurses, creating a link between health workers, for the greater benefit of the child.

HOME BIRTHING

by Véronique SERIEYS

Perinatal risks linked with birth at home are compounded by isolation, poor sanitation and lack of the equipment needed to cope with emergency situations of all sorts. In this case, the main task incumbent on the medical workers present is :

— to apply (or direct the application of) the basic rules of hygiene, so as to avoid infectious complications, which are often lethal ;

— to very rapidly perform certain elementary, easily learned procedures, in case the child is threatened with anoxia.

But accompanying a birth also means being respectful of local traditions, and of the "mother-child-father" bond that develops immediately.

Material conditions

In addition to the items representing the strict minimum required for a satisfactory delivery, the following should be prepared :

— a foetoscope and a stethoscope ;

— a thermometer ;

— either a suction bulb or a probe attached to a 20 cc or 50 cc syringe (for the suction of mucus) ;

— gloves ;

— a tube of tetracyclin ointment or a 1 % silver nitrate solution for ocular instillation ;

— alcohol, or iodized alcohol for the navel ;

— a flashlight is always useful ;

— sterile compresses ;

— material for cutting the cord (scissors or razorblades, thread) ;

— clothing for the baby, to be kept warm.

Early care

Children are exposed to three dangers immediately after delivery : infection, heat loss and more rarely, anoxia. For this reason, care must be given as aseptically as possible, and rapidly so as not to expose the child to cold. Speed does not mean haste, however, and during resuscitation in particular, should not result in roughness such as frictioning with cold water or more or less violent slaps, which only contribute to the obstretrical trauma.

What to do first

The baby seems well, delivery was eventless : the child cries and moves about, the heart is beating rapidly (over 100 beats/min), the Apgar score is 8 or higher at 1 minute. There are then a number of well-defined things to do.

Satisfactory state

Prevention of heat loss mostly involves drying the child with a clean loincloth. The baby is placed on his/her back, slightly propped up with a folded loincloth at the nape of the neck. The nostrils are gently cleared, using a suction bulb or a small probe connected to a 20 or 50 cc syringe. If no appropriate instrument is available, as much mucus as possible should be removed by hand, after covering the fingers with a compress or a piece of clean cloth.

Difficulties

The child is not in good condition, lacks muscle tone and may be pale and cyanosed. Breathing is absent or inefficient. Assessment of the heartbeat then determines what should be done, following the abovementioned initial care. This type of simple resuscitation can always be done at home. Two situations may be encountered.

The heartbeat is only moderately affected, with 80 or more beats/min. The Apgar score is usually between four and seven at one minute. The newborn is suffering from respiratory depression, requiring direct mouth-to-mouth artificial respiration. If crying cannot be induced by ordinary stimulation such as blowing on or slapping the soles of the feet or buttocks, and no instruments are available, this method may be effective in itself.

The heart beat is very slow, under 80 beats per minute. This is a state of apparent death, indicative of severe perinatal anoxia or circulatory failure along with respiratory depression. In such emergencies, two things must be done rapidly : assisted ventilation, as above, and external massaging of the heart.

Bonds

The mother-child relationship should not be neglected whatever the context. It began long before delivery, but continues to develop fully within minutes of birth. Mother and baby must get to know each other, and it is preferable to leave them this special time before continuing to care for the child. Local traditions must be respected here (presence or absence of the father and of siblings, mother's desire, etc...)

Care for cord

The umbilical cord must be given special attention, since terrible infections such as tetanus or septicaemia may enter through it. Hands should be thoroughly washed before taking care of it. After checking for the presence of two arteries and one vein, a ligature is made about 1 cm above the junction between the skin and the cord, and another one is made a bit further toward the mother. It is a good idea to place the newborn slightly below the mother, so that he/she will receive all of the iron-rich foetal blood from the placenta. This is a small contribution to the prevention of iron deficiency, a highly frequent condition. The cord should then be cut, between the two ligatures, using sterile scissors at best, and if not a boiled razorblade. A compress (or clean, dry cloth) dipped in alcohol (pure or iodized) is applied to the cut end.

It is preferable not to apply any staining agent, so that development of jaundice of the newborn will be visible on the cord. Attendants with a good understanding of traditional practices will allow some of these to be transmitted, while combating other, harmful ones such as the application of cow dung to the cord, by education for health at the family level. Further observation of the cord during the ensuing hours is necessary, to detect any bleeding requiring another ligation.

Eyes

The eyes are washed, using an outward movement, with a compress (or a piece of clean cloth used exclusively for this) and boiled water. Ophthalmic-gonococcic prophylaxis is ensured by placing a drop of 1 % silver nitrate in each eye, making sure that it runs over the entire conjunctival membrane, or applying tetracycline ointment. If neither of these is available, a few drops of lemon may be used.

Washing

The baby is washed with soap and boiled water, taking care not to remove the vernix caseosa that covers the skin and constitutes a natural protection against heat loss (it disappears spontaneously

within hours). He/she is dressed in "clothing" warmed up in advance, and placed in a warm place, or even better near the mother's body, if local customs permit.

Temperature

Once this has been done, it is important to check the baby's temperature, to make sure there is no secondary hypothermia.

Examination

A more complete examination should be performed within an hour of birth, so as to :

— assess adjustment to extrauterine life, following early care ;

— detect any obvious obstetrical trauma ;

— detect any anomaly or pathology requiring rapid referral to an appropriate care centre.

The child's state may be assessed by visual inspection and palpation. The findings are communicated, recorded on the health booklet when necessary, and the mother, or the extended family, reassured.

Tetanus

Two situations require special attention. If childbirth occurred in total isolation, with a complete lack of hygiene, and if the mother was not vaccinated against tetanus before pregnancy, antitetanus seroprophylaxis should be administered automatically within hours of birth (750 IU of gamma-globulin, subcutaneously, half of which should be peri-umbilical, and one dose of vaccine). If the child was born over forty-eight hours after rupture of the membranes, or if the amniotic fluid is tainted or infected, preventive antibiotic treatment should be considered.

Infection

Breast-feeding

Promotion of breast-feeding is a must in developing countries, where babies' health and even their lives may be threatened by bottle-feeding. The continuation or development of breast-feeding is a high-priority task for health personnel.

The child should be put to the breast as soon as possible, and no later than three hours after birth. Early feeding is in fact the best prevention against hypoglycaemia. Further, early nursing stimulates lactation, and the sucking reflex peaks within hours of birth, to decline thereafter.

Colostrum

It is often necessary to combat the myth, prevalent in many cultures, that colostrum is a poison. The excellent nutritive value of colostrum and the fact that it contains antibodies that protect the newborn against infections should unhesitatingly be repeated. If the message is rejected, the mother is encouraged not to deprive her baby of food, but to spoon-feed him/her boiled water, preferably sweetened, but not give a bottle. The child is put to both breasts, to stimulate lactation at first, and then to one breast at each feed, to make sure it is emptied properly. Babies should be put to the breast on request, as they like, and neither be restricted nor forced.

Mother's diet

Attention should be paid to the mother's diet, and advice given, modulated by her nutritional status, the food available, her usual diet and eating habits :

— drink large amounts of water, and milk (when available),

— have a balanced diet, richer than usual, especially in proteins, dairy products, green vegetables and fruit. This involves educating those around her.

Proper hygiene is all the care needed : washing the breasts daily with soap and water, washing hands before each feed, washing the nipple before and after each feed, using boiled water.

If the milk flow is inadequate, the mother should be encouraged to continue breast-feeding, and advised to put her child to the breast more often, to eat properly and not to overtire herself. Use of harmless, traditional galactogenic substances should absolutely not be condemned. In the extreme case where lactation does not occur or is interrupted, a replacement, be it cow's milk, goat milk or powdered milk, must be provided. In every case it must be diluted, using boiled water. The resulting preparation is then boiled again. Cup or spoon feeding should be preferred to the baby bottle. Make sure that the mother and family clearly understand the different phases of its preparation.

First week

During the first week, attention should be paid to :

— the beginning of breast-feeding and the infant's appetite, bowel movements and especially, the discharge of meconium within the first 2 days ;

— the first miction, which generally occurs within 24 hours ;

— absence of vomiting, except for normal infant regurgitation ;

— temperature ;

— detection of jaundice : the child should be examined in daylight ;

— detection of infection, especially skin infection, purulent conjunctivitis, umbilical infection and thrush.

Causes for concern :

— the child does not suckle well, becomes hypotonic and whining,

— no bowel movements occur,

— the child does not urinate,

— any uncontrollable whining, sometimes connected with a bloated abdomen,

— severe anaemia, intense cyanosis or jaundice, early or late,

— signs of infection with fever or occasionally hypothermia,

— signs of dehydration, diarrhoea, respiratory difficulties or convulsions, spasms and a rigid neck.

In these cases, the probability of septicaemia or neonatal tetanus

—depending on the combination of these signs— should always be considered.

Prevention of these potential neonatal complications depends on the family's awareness of the need to observe strict hygiene in child care.

Essential action

This mainly involves :

— keeping the baby in a calm, clean place, away from smoke and dust ;

— covering the "cradle" with a fine cloth, or better yet, with a mosquito net ;

— washing the baby daily with soap and —preferably— boiled water ;

— keeping the baby dry, so as to avoid any irritation and source of infections ;

— respecting the rules for hygiene in caring for the umbilical cord, and keeping it dry. The direct application of traditional substances should be avoided ;

— encouraging traditional practices such as carrying the baby and massages, which have many advantages. The most important of these is the close body contact established between mother and child, which contributes to emotional bonding and to psychomotor development in much the same way as breast-feeding.

34 **Birth and education for health**

Home birthing is a particularly good time for talking with the mother, the father or even the extended family. They may be reminded of the need to respect the immunization schedule, especially for BCG vaccination, which should be performed as soon as possible, particularly when there is a potential risk of infection (tuberculosis in the family). The reasons for MCH attendance are explained : the infant's psychomotor development will be monitored, any precursory signs of complications detected, and illnesses treated. Emphasis is placed on the value of breast-feeding, along with mention of porridges (made of local produce) and of the need to diversify the diet toward age four to six months. The problem of contraception and of the methods available is discussed, with emphasis on the importance of spacing births.

In conclusion, to keep risks to a minimum in home birthing, the best prevention is the regular monitoring of expectant mothers, either by the health centre or by trained village birth attendants. In each development sector the perinatal risk should be assessed, pathological pregnancies requiring delivery in a maternity hospital detected, and mothers persuaded to accept antitetanus vaccination. Signs of hypoxia (bradycardia, tainted amniotic fluid) should be checked before expulsion. Postnatal care is a particularly favourable time for the communication of education for health messages to families.

For this reason, the implementation of programmes interconnecting the various aspects that lead from proper monitoring of

pregnancy to childbirth under satisfactory conditions of hygiene, and possibly without risk, from immunization and better feeding of children to reduced infantile mortality, would break the vicious circle of galloping fertility, thus reinforcing the "mother-child-father triad", which is often part of a broader system of family relations.

TEN CONDITIONS FOR SUCCESSFUL BREAST-FEEDING (1)

Every establishment providing birthing facilities and care for newborns should :

1 - adopt a policy promoting breast-feeding, put it in writing and communicate it systematically to all health workers ;

2 - make sure all health workers are competent to implement this policy ;

3 - inform all pregnant women of the advantages and practicality of breast-feeding ;

4 - help mothers to begin breast-feeding within one half-hour of birth ;

5 - inform mothers of how to breast-feed and how to prolong the milk flow even if they are separated from their baby ;

6 - do not give newborns any food or drink other than breast milk, except for medical reasons ;

7 - leave the child with his/her mother 24 hours a day ;

8 - encourage breast-feeding on the baby's request ;

9 - do not give breast-fed infants any artificial nipple or baby comforter ;

10 - encourage the development of support groups for breast-feeding, and refer mothers to them as soon as they leave the hospital or maternity unit.

(1) WHO-UNICEF recommendations.

NEONATAL DEPRESSION

by Jean-Bernard JOLY

In developing countries, 6 to 8 % of newborns suffer from respiratory problems at birth. There are many causes : gestational pathology, pre-existing maternal pathology, dystocic presentation, physical exhaustion caused by birthing efforts. Over three-fourths of births take place at home or in tiny maternity services, with the help of a member of the family or of a traditional birth attendant. Most of these people have never been trained in birthing care, and look on helplessly as children who could easily be saved under other circumstances die. It is with these people in mind that I have written this paper ; although illiterate, they may be taught that asphyxia at birth is neither inevitable nor an act of vengeance of the spirit world. They can understand its causes, learn to identify them, and thus help to avoid it. They are capable of understanding the mechanism behind these disorders, and of learning to perform simple procedures which, in the immense majority of cases, are life-saving.

To teach others, one must first have the necessary proficiency oneself. For this reason I will also discuss more complicated acts, performed in particularly well-equippped maternity hospitals, where resuscitation may be formed in the delivery room. Although the situations are different, and the instruments are more sophisticated, the symptoms, the bases underlying treatment and the necessary procedures are the same.

The first part of this paper deals with some basics of physiology and pathological physiology, required for the comprehension of the difficulties encountered by neonates following a problem birth. The circumstances under which the occurrence of a problem birth may be anticipated — that is, birth hazards for newborns — are briefly described. A second part is devoted to the description of what to do, in the form of technical notes. The third deals with case-appropriate management, and monitoring of the child after birth. A fourth part is devoted to the teaching of treatment management.

A REVIEW OF PATHOLOGICAL PHYSIOLOGY

At birth, the newborn must adjust to life outside the womb, with its two major reorganizations : air enters the lungs and alveoli, resulting in breathing, while a separation occurs between pulmonary and systemic circulation.

CIRCULATION OF AIR IN THE LUNGS

Before birth, the trachea, bronchi and alveoli are filled with a fluid that is constantly being secreted. At birth, three events occur :

— evacuation of the pulmonary fluid, by compression of the chest as the child moves down the mother's genital tract ;

— respiratory movements begin, often as soon as the chest is delivered : this is due to a combination of factors, including the inhaling reflex following severe compression, cold on the face, contact with air, relative hypoxia ;

— the first cry creates pressure equivalent to 60 to 80 cm H20 in the lungs.

These three occurrences result in the creation of a residual functional capacity, or pulmonary volume that persists upon forced expiration, and constitutes the space in which gaseous exchanges between the blood stream and the air take place.

SEPARATION OF PULMONARY AND SYSTEMIC CIRCULATION

Before birth, only the right heart is functional : the venous blood from the entire body flows into it from the right auricle, through the inferior and superior vena cava, while the oxygenated blood coming from the placenta through the umbilical vein and the canal of Arantius, passes through the liver and the inferior vena cava before entering it. The right ventricle sends the blood to the aorta through the arterial duct. Circulation is mostly active in the head and placenta, while it is practically nonexistent in the lungs (10 % of the total heart flow).

At birth, four events occur :

— pulmonary aeration increases the volume of the chest, making blood circulation possible. The right ventricle easily sends blood to this part of the body, owing to the low pressure there (see n° 1 on figure 4) ;

— the left auricle receives oxygenated blood from the lungs. The high pressure closes Botallo's foramen (see n° 2) ;

— the elimination of placental circulation decreases pressure in the inferior vena cava (see n° 3) ;

— the arterial duct to the aorta gradually closes (see n° 4).

However, a number of events are involved in this adaptation, which remains uncertain. Any disturbance of circulation or of pulmonary functioning deprives the blood of oxygen, resulting in anoxia.

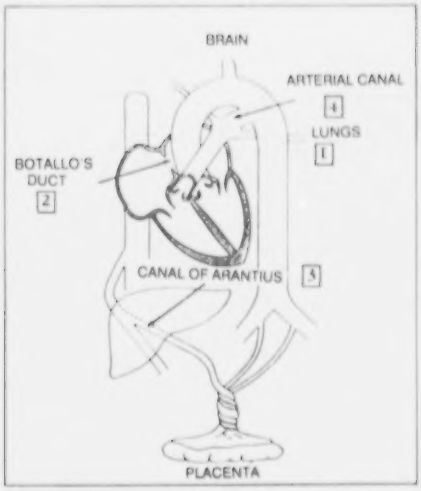

Figure 4 : Diagram of foetal circulation.
□ : Main haemodynamic modifications at birth

PATHOLOGICAL FACTORS INVOLVED IN NEONATAL ASPHYXIA

Three pathological occurrences are connected with neonatal asphyxia at birth :

- the fluid contained in the airways is not evacuated ;
- circulation is inefficient ;
- cerebral anoxia ensues.

If the fluid contained in the airways is not evacuated, and thoracic compression and crying do not occur, the baby may literally "drown". Premature intrauterine breathing caused by anoxia in foetal suffering is an aggravating circumstance, with the inhalation of amniotic fluid containing meconium : this is the amniotic or meconial aspiration syndrome. The disturbance of gaseous exchanges induces respiratory acidosis.

Inefficient circulation : prolonged anoxia during foetal suffering or post-natal anoxia caused by inability of breathe produces metabolic acidosis as well as bradycardia, sending less blood out, particularly to the vital parts : the myocardium and the brain.

Cerebral anoxia is the result of the above two processes. It may end in death of the brain, or similar states, with terrible motor, mental and sensory consequences.

DETECTION OF DIFFICULT DELIVERIES

The probability of a difficult delivery may often be predicted in the course of pregnancy. It does not occur by chance, and should not come as a surprise.

AT-RISK GROUPS	
• young primiparas or great multiparas	• mothers with AIDS
• mothers with heart disease or respiratory insufficiency caused by tuberculosis	• toxaemia of pregnancy
• twin births	• placenta praevia
	• diabetic or obese mothers
	• mothers with aftermaths of poliomyelitis

FACTORS OCCURRING DURING LABOUR	
• protracted labour, maternal exhaustion	• prolonged rupture of the membranes (over 12 hours)
• tainted or meconial amniotic fluid	• prolapse of the umbilical cord
• hypertonic uterus	• maternal fever (infection or bout of malaria)
• blood in the amniotic fluid, bleeding in placenta praevia	• caesarean section (irrespective of the cause)
• premature delivery	• prolonged slowing of the heart sounds following contractions
• administration of sedatives or of general anesthaesia to the mother	

WHAT TO DO

EQUIPMENT

In maternity hospitals, the neonatal resuscitation corner should always be in order, ready for use.

It contains :

- a washbasin for hand-washing, with soap, preferably liquid,
- a working surface, with a heater system,
- probes, a manual ventilation device,
- a source of oxygen,
- an aspiration system,
- a laryngoscope.

In small maternities, the resuscitation corner may be simplified. The elements may be made by a cabinet-maker (figure 5).

Traditional birth attendants must also possess some simple equipment : soap for washing their hands, and simple devices for aspiration and assisted ventilation.

PERSONNEL

It is indispensable that workers receive training, but the nature of the latter depends on where people will be working, and the equipment they will have at their disposal. Midwives working in a university hospital centre, those employed in a small rural maternity and traditional birth attendants who go to women's homes will not receive the same training. Irrespective of the person, the technical equipment and the place of work, every one of these workers should be able to do the following, using the means at his or her disposal :

- clear the airways of fluid,
- induce breathing,
- assist defective circulation,
- achieve cleanliness when working.

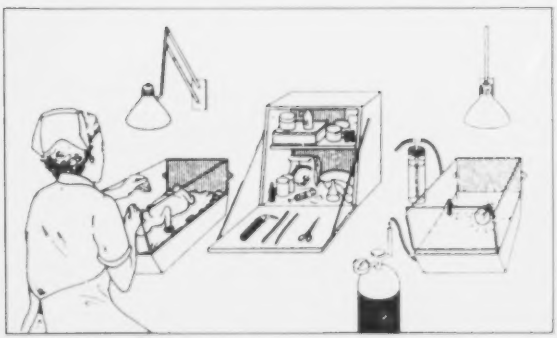

Figure 5 : Resuscitation at birth, setting up the equipment. A board is hung on the wall. A lamp placed above the baby or a light bulb underneath provides heat. The nurse is seated on a high stool, or remains standing. All resuscitation equipment is kept at hand.

Source : D. MORLEY, Pédiatrie dans les pays en voie de développement - problèmes prioritaires, Flammarion - Médecine-Sciences, Paris, 1977, p. 89.

CLEARING THE AIRWAYS

The upper airways (pharynx, nasal fossae) must be rid of any secretions that remain there and may be drawn into the trachea during deep breathing. Occasionally tracheal aspiration must be done immediately, when amniotic fluid containing some meconium is already lodged there. Clearing of the upper airways is always the first thing to do before spontaneous breathing occurs, and before resorting to assisted ventilation and oxygenation.

When this is done well, it is often sufficient, and no other action is required.

Simple techniques

These may be performed by anyone, anywhere, even at home. They involve :

— turning the head to one side during delivery and cleaning the mouth with a finger wrapped in clean cloth as soon as the head comes out, in a vertex presentation ;

— inclining the baby and cleaning the mouth with a finger wrapped in clean cloth ;

— massaging the chest, performing manual thoracic pressure. On the nursing stand, the baby's chest is held in the palms of both hands and pressed gently, from the abdomen toward the head. An assistant cleans the mouth of secretions, using a finger wrapped in clean cloth or aspiration. One or two of these manoeuvres is sufficient.

A more sophisticated technique : aspiration

Several devices are available. Suction-bulb aspirators are quite handy and economical, but not very powerful. If they are not cleaned and boiled after each use, they are a terrible source of germ propagation.

With disposable aspirators, suction is done by the mouth of the operator. Mouth aspirators may be reutilized, provided they are carefully cleansed ; that is, disinfected using a decontaminant solution, and boiled.

There are many foot-driven aspirators. Cleaning of these is more delicate. In well-equipped hospitals, electrical aspirators with a wall supplier may be used. The vacuum should be set at a depression of 200 cm H_2O at most. Probes (with a calibre no lower than Ch 8 or 10) must be systematically cleaned and sterilized after use.

The time for aspiration is the same as for hand clearing of the mouth — as soon as the head comes out, before the first breath when possible — and replaces it.

Before the shoulders are delivered, the position of the child's head is unimportant. After delivery, the child is placed on his/her back, head turned toward the attendant, neither too flexed nor too unflexed. Aspiration must reach the mouth and pharynx, the nasal fossae, the stomach and possibly the trachea. The mouth must be emptied first, to avoid inhalation of secretions if a gasp occurs. This is one means of stimulating breathing. Repeated aspiration may be necessary. The nasal fossae are cleared by introducing the probe into the nostrils to a distance of about 4 to 5 cm, only once on each

side, to avoid the creation of a traumatic oedema. For the stomach, the probe is introduced to the distance separating the nose from the navel.

Tracheal aspiration is recommended when the amniotic fluid is heavily tainted or meconial. A large, Ch 8 calibre probe is then used. A laryngoscope is used to introduce it (see intubation).

In all cases, aspiration is only performed once the probe has been removed.

STIMULATING BREATHING

Tactile stimulation

Aspiration of the mouth and massaging of the chest are excellent ways of stimulating breathing. Tactile stimulation is very effective in starting breathing in a moderately depressed newborn. It is only applied after careful aspiration of the upper airways, and should not be prolonged for more than 30 to 60 seconds if the child does not react.

The soles of the feet are stimulated by taps or by fillips on the heel (see figure 6).

Active, firm rubbing stimulates the back (see figure 6). Other techniques such as slaps or bathing are no longer recommended.

Oxygenation

Contrary to frequent claims, it is not absolutely necessary to administer oxygen. There is enough oxygen in the air — 21 % — to achieve over 95 % saturation of haemoglobin. Haemoglobin then contains as much oxygen as possible, the blood is red and the child is pink.

Figure 6 : Tactile stimulation of breathing
Source : F. GOLD : Cours de réanimation du nouveau-né, Centre Hospitalier Régional et Universitaire, Tours, 1989, p. 10.

Only the fingertips remain blue, occasionally. This peripheral cyanosis should not be taken into consideration.

Oxygenation is only indicated when, following correct aspiration and stimulation, the buccal mucosa are still cyanosed although the child does breathe (sometimes with difficulty).

Concentrations should be high at first (about 80 %). In the free-flowing administration technique, an oxygen tube with

a flow of 5 liters/minute is placed near the baby's nose. When the tube is placed at a distance of 1.25 cm, 80 % of the oxygen reaches the airways ; at 2.5 cm 60 % is delivered, and at 5 cm 40 % of the oxygen is delivered (see figure 7).

When the baby turns pink, the concentration of oxygen is decreased until it reaches the atmospheric concentration. It is important to make sure the baby stays pink.

Persistent cyanosis indicates the existence of respiratory or heart pathology. Oxygenation must then be pursued, with a concentration just high enough to combat cyanosis.

Assisted ventilation

The purpose of this is to dilate the pulmonary alveoliso as contribute to the creation of a residual functional capacity ; that is, a permanent intrapulmonary gaseous space in which exchanges may take place between the air and the blood. It also compensates for natural breathing if the newborn does not begin to breathe immediately (because of impregnation with an anesthetic, for instance).

Assisted ventilation should be preceeded by careful aspiration of the upper airways, and an attempt at tactile stimulation when spontaneous breathing does not begin immediately.

The child's head is placed in moderate hyperextension, and the lower jaw is pushed forward to free the tongue. It may be useful to introduce a N° 0 Guedel cannula to hold the tongue back.

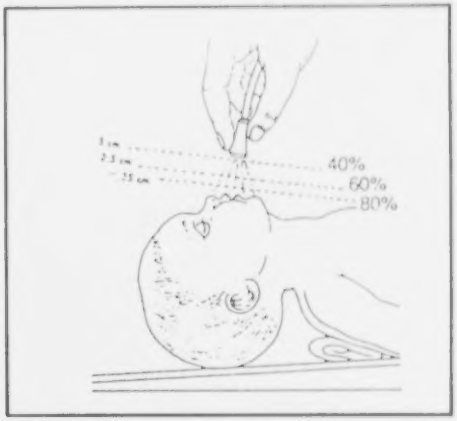

Figure 7 : Free-flowing oxygen. The concentration of O2 in inhaled air depends on the distance between tube and nostrils.
Ibid, p. 12.

Mouth-to-mouth

The simplest method is mouth-to-mouth artificial respiration, which may be practiced anywhere and should be taught to traditional birth attendants who have no equipment at their disposal (see figure 8).

It should be recalled that mouth-to-mouth artificial respiration must always be preceeded by manoeuvres aimed at freeing the upper airways. The attendant is on one side, and applies his or her mouth to the baby's mouth and nose so as to occlude them as completely as possible. He/she then blows lightly and repeatedly, about 30 times a minute, without tensing his/her cheeks, so as to limit the first insufflation. This is effective when the chest wall is seen to rise (see figure 8).

Mouth-to-mask

In mouth-to-mask assisted ventilation, a mask is applied to the child's face : it serves as intermediary between the child and the attendant who is blowing.

There are two advantages to this method : hygiene and convenience. Since the attendants's face is farther from the child's face it is easier to see whether the chest is rising. A round mask is used, and an extra hole is made on the side, fitted with a 20 cm tube with a cotton filter and a mouthpiece on the end. The central opening in the mask is left open. The mask is placed on the child's face (see assisted ventilation using a mask and self-dilating bag). The attendant blows air in, just as in the mouth-to-mouth. The central opening is obstructed with one finger during insufflation, and freed during exhalation, for the evacuation of exhaled air. This technique may be taught at all levels, including the traditional birth attendant level.

Mask and bag

In hospital centres and well-equipped maternities, the mask and self-dilating bag technique is used. This has the added advantage of making hyper-oxygenation possible. This technique requires

Figure 8 : Mouth-to-mouth artificial respiration. Position of the child's head. Nurse's position.
Source : G. HUAULT, Techniques de réanimation du nouveau-né et du nourrisson, Revue du Praticien, 1969, XIX, 29, p. 5.

special equipment, and above all a manual, ambu or laerdal, self-dilating assisted ventilation device, containing an appropriate oxygen reservoir and a "neonatal" facial mask. A source of oxygen must be fitted to the device, with a flow of 5 l/minute. Last, aspiration material must be available : a Ch 8 probe for the pharynx and nostrils, and a wall vaccuum supplier, a foot-driven or mouth aspirator.

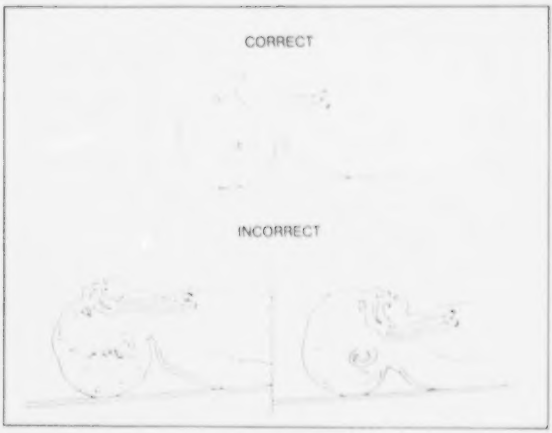

Figure 9 : Assisted ventilation of the newborn : how to position the head.
Source : F. GOLD, op. cit., p. 18.

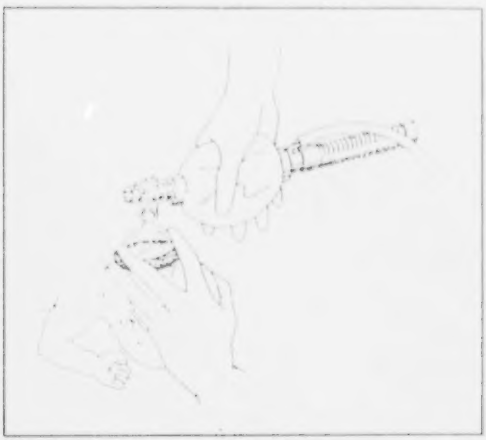

Figure 10 : Assisted ventilation using mask and self-dilating bag.
Source : J. LAVAUD et al, Réanimation et transports pédiatriques, Paris, Masson, 1985, p. 19.

The child is placed in dorsal decubitus, head moderately unflexed so as to free the base of the tongue properly (figure 9). This manoeuvre requires one or two attendants with perfectly clean hands.

If child's breathing is still nonexistent or inadequate after buccal and nasal aspiration and tactile stimulation, the manoeuvre is begun. The mask is placed on the child's mouth and nose. If it is triangular, the point is placed on the nose. The left hand holds the mask in place, with the thumb on the forehead, the index on the edge of the mask near the base of the nose, the middle and ring fingers on the chin edge of the mask, and the little finger is placed under the chin to maintain the head in an unflexed position (see figure 10).

Ventilation is performed by pressing rhythmically on the bag, using the thumb and two fingers of the right hand : 60-80 pressures/minute. The effects are observed : if the chest rises and the child turns pink, it is a success. Gentle pressure is sufficient (thumb and two fingers). In case of failure, the chest does not rise. The child remains blue. Strong resistance is felt during insufflation. The jaw should then be held shut, the pressure safety valve blocked with one finger, and greater pressure exerted on the bag (no more than once or twice) to force the alveoli open.

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ASSISTING DEFECTIVE CIRCULATION

External massaging of the heart allows the blood to circulate to the lungs and the rest of the body, especially the coronary arteries and brain. This extreme, life-saving manoeuvre should only be done once the existence of circulatory failure has been ascertained. The latter is defined by the absence of detectable carotid and femoral pulses (but these are not easy to perceive, especially in an emergency-fraught atmosphere) and by the absence of heart sounds during auscultation of the chest, or perception of extreme bradycardia, below 30 to 40 beats/minute. It should always be preceeded by careful aspiration of the upper airways and accompanied by assisted ventilation, using mouth-to-mouth, mouth to mask, or mask and self-dilating bag with oxygen, depending on the facilities.

One person can perform massage and assisted ventilation alone, but it is preferable to be two : one person performs assisted ventilation with the mask and bag, while the other massages the heart.

The chest of the neonate or infant is held in the palms of both hands, with the fingers interlocking in his/her back. The thumbs are joined in front, and press down rhythmically and rather briskly on the midline, at the height of the nipples (figure 11). This should neither be done caressingly nor roughly. Pressure should be exerted once per second. It is always combined with assisted ventilation with a mask or mouth-to-mouth, with a rhythm of one respiration for four heart massage pressures.

The efficacy of the manoeuvre is corroborated by listening to the heartbeat and observing whether the child turns pink.

Figure 11 : Position of the hands for external massaging of the heart.
Ibid, p. 21.

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TRACHEAL INTUBATION

Tracheal intubation is valuable in two situations : for intra-tracheal aspiration, and when assisted ventilation using a mask is ineffective. Otherwise, simple techniques are usually sufficient.

Tracheal aspiration may be performed at birth, before any air is inhaled, toward the end of foetal suffering attended by amniotic fluid permeated with meconium. This avoids having plugs of meconium pushed into the bronchioli and obstructing them, causing the terrible meconium aspiration syndrome.

Tracheal intubation is valuable if assisted ventilation with a mask is ineffective, a rare occurrence if it is performed correctly. This may be the case in one rare condition : a herniated diaphragm, but even then it is usually not totally ineffective. Last, intubation is necessary for a child with respiratory distress, when assisted ventilation must be continued until transferral to a specialized centre.

The books listed in the bibliography provide a perfectly adequate description of this technique ; the reader is referred to these for all details.

There are three commandments : do no harm, be efficient and learn the procedures

Do no harm

When anoxia occurs, as it may in problem deliveries, every minute counts. Intubation absolutely must be performed extremely rapidly, within 30 seconds, since the manoeuvre itself considerably disturbs the baby's breathing and increases anoxia. If performed roughly, the tongue and pharynx may be injured, creating entry points for infection.

The tube must be placed in the proper position at the first try. If it is pushed too far into the right stem bronchus the left lung is bypassed, and hypoxia is not treated. In addition, this results in pneumothorax. The tube must be properly fastened to the skin. Ventilation through the tube must always be gentle, to avoid rupture of the alveoli. An intubated newborn can not necessarily be extubated within minutes. He/she then becomes a "very high risk" patient, for whom subsequent treatment must be unerringly provided. Transportation of an intubated newborn is a dangerous, often lethal adventure. Last, a single intubated, ventilated infant necessarily drains all of the energy available in a hospital service.

Be efficient

Being efficient means undertaking intubation with a real hope of rapid clinical improvement, barring which it is preferable to refrain from it. When intubation, followed by assisted ventilation, is performed on children who have suffered from extremely protracted anoxia, they may save lives at the price of the catastrophic neurological problems characteristic of chronic post-anoxia encephalopathy.

Learn the procedure

The procedure should first be learned on a dummy. Another good way to learn is to practice intubation on stillborn infants. After this, working with an experienced technician enables the latter to

communicate information on when or when not to operate, and to guide the apprentice in his or her first attempts.

In conclusion : tracheal intubation combined with aspiration or assisted ventilation may be the best or the worst thing to do. There are few indications. Teaching efforts for the majority of workers should concentrate on simple aspiration techniques, and on assisted ventilation using a mask and bag.

PREVENTION OF HEAT LOSS

When a normal newborn is placed in a room heated to 24C without taking any particular precautions, his/her temperature drops from 37 to 33 within about 15 minutes. If he/she is placed in a draught, this happens even more rapidly. Heat loss is one cause of neonatal mortality of normal newborns (owing to neonatal pneumonia). It is an aggravating factor contributing to the death of premature and small-for-date newborns. The main cause of heat loss in newborns is the evaporation of the liquid that covers them. A bather coming out of the water immediately picks up a bath towel and dries his/her body.

Irrespective of the child's state, the first nursing care to be given is drying.

Drying is done with a clean cloth. The very act of drying is gently stimulating and activates breathing. When the baby is dry, the cloth is moist and must be replaced by a dry one. If a heating lamp or a resuscitation table is available, it heats the air, affording a warm atmosphere in which to work.

Once resuscitation is over, the child is dressed and placed either in contact with the mother, or in an incubator or a heated cradle, depending on the circumstances and on what is feasible.

MANAGEMENT

REASONING

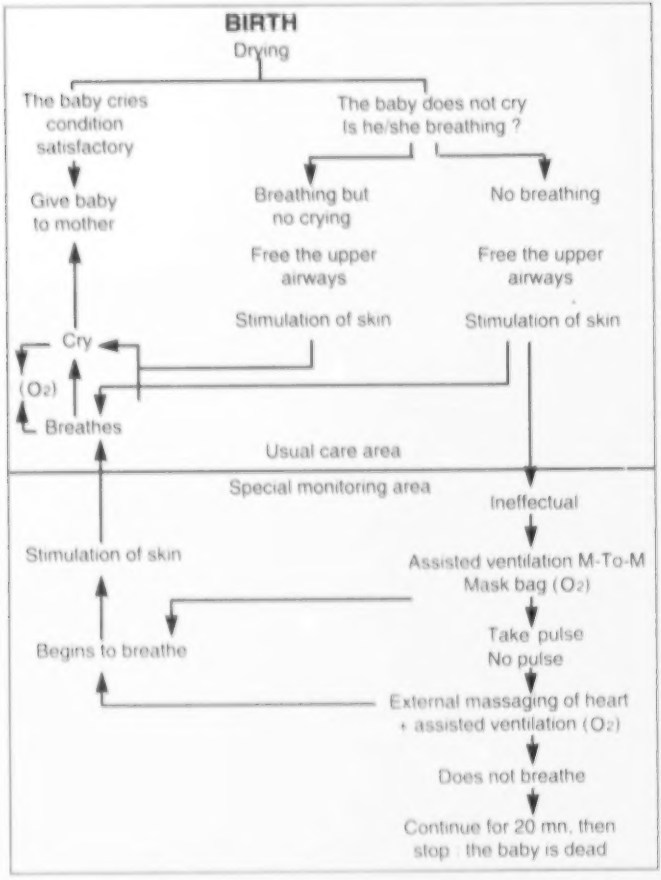
To manage treatment of an asphyxiated newborn efficiently, the steps are as follows :

- evaluate his/her condition ;
- decide what must be done ;
- act accordingly ;
- observe the effects ; decide, depending on the subsequent developments, whether to continue the same procedure or to choose another line of action ; do what is necessary.

TREATMENT

Better than a long explanation, table 6 charts management of an asphyxiated newborn at birth. This extremely simple decision-making tree may be explained to all workers, irrespective of how skilled they are.

Table 6
MANAGEMENT OF AN ASPHYXIATED NEWBORN



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Some points must be stressed, however. Asepsis during care is essential, since the nasal fossae, skin and navel are touched by these manoeuvres, and they are the usual entrance sites for germs at this age.

Warming up and prevention of heat loss are very important, even in so-called hot climates.

At present, drugs are less often needed ; except for antagonists to any antidepressors the mother may have been given before or during delivery :

— using the antidote for narcotics, Nalaxone or Narcan : 0.01 mg of the drug/kg administered in IV, IM or subcutaneous injection, or intra-tracheally ;

— 0.4 mg vials = 1 ml : place the contents of the vial and 1.5 ml of physiological salt solution in a 0.5 ml syringe. Inject 0.1 ml/kg of this solution ;

— 0.02 mg vials = 2 ml. : inject 1 ml/kg.

Table 7 shows the main drugs and doses that may be needed to treat infants at birth.

Table 7
MEDICATIONS AND SOLUTIONS USED IN DELIVERY ROOM RESUSCITATION

Médication	Concentration	Preparation	Dose/Route*
Adrenalin	1:10.000 (0.01 %)	1 ml vial = 0.25 mg + 1.5 ml phys. salt sol.	0.1-0.3 ml/kg IV or IT
Fillers	whole blood 5 % albumin phys. salt sol. Ringer lactate	40 ml	10 ml/kg IV
Sodium bicarbonate	0.5 mEq/ml (4.2 % solution)	20 ml or 2 × 10 ml	2 mEq/Kg IV (= 4 ml/kg)
Naloxone	0.4 mg/ml	0.5 ml (1/2 vial) + 1.5 ml physio. salt sol.	0.1 ml/kg IV, IM, SQ, IT
	0.01 mg/ml	2 ml (1 vial)	1 ml/kg IV, IM, SQ, IT

** IM : Intramuscular ; IT : Intra-tracheal ; IV : Intravenous ; SQ : subcutaneous.*

Source : Textbook of neonatal resuscitation, 1987/89, American Heart Association.

Hypoglycaemia is frequent following a difficult delivery. It may easily be corrected by early feeding if it is feasible, given the child's condition. If he/she is unable to drink (risk of milk going down the wrong track), an intravenous infusion of 10 % glucose solution (60 ml/kg/24 h) is recommended, along with early continuous orogastric feeding.

As seen above, the child's state at birth is evaluated by simple inspection, based on two criteria : breathing (presence or absence,

or laboured) and crying (energetic or weak). The Apgar score is of no use at this point, in the decision as to whether or not to implement complex resuscitation techniques. Its evaluation at one minute, 5 minutes and 10 minutes provides an indication of the improvement or deterioriation of the baby's clinical state.

POST-NATAL MONITORING

Successful treatment of an asphyxiated newborn is a battle won against death. But this victory must be consolidated by monitoring of the child and assisting the mother by sensible advice on childraising. Complications occasionally occur, until a late date, and may jeopardize the first, dearly earned success.

SOME PROBLEMS

Some difficulties may arise during the first hours and days, in these newborns. They are put to the breast within hours of birth. If a child is unable to suckle, orogastric feeding or infusion is required.

The baby is kept warm by placing him/her either near the mother, in contact with her body, or in an incubator or a heated cradle, when the mother is not available, or when close monitoring is required : that is, in very depressed, neuropathological or very-low-weight babies.

Body cleanliness is one way of preventing infection : washing the child with soap and warm water is sufficient. The sensitive points (eyes, navel) are cleaned aseptically.

As for the mother, the onset of lactation is checked. The child's sucking is essential for this.

In problem deliveries, maternal infection is a frequent complication, and may cause death or, at the least, great fatigue and malnutrition, resulting in insufficient milk secretion.

TRAINING

Apprenticeship is definitely the best method. However, it can only be practiced in places where there are many deliveries as well as an experienced monitor, constantly available. Furthermore, every individual who may be called upon to attend a birth should possess the necessary basic training, even if only a few emergency situations occur each year.

The level of training depends on the participants' previous knowledge. It is necessarily different if it addresses a group of midwives or of traditional birth attendants. Training of the latter must take their educational level into consideration, and make use of their extraordinary auditory memory.

The teacher should set some simple objectives for him/herself, relative to each topic dealt with, the proper comprehension of which should be checked by oral or written testing.

In practice sessions using dummies, each participant should always be allowed to work individually.

Table 8 outlines a training project including six topics, taught in one half-day each, all constructed along the same lines :

— a presentation of the factual prerequisites for this particular topic ;

— the contents ;

— practical exercises.

Table 8
TRAINING PROJECT

Lesson	Previous knowledge required for understanding the topic	Content	Exercises
1	How breathing begins : the mechanism How blood begins to circulate in the lungs	Consequences of delayed inhaling : amniotic aspiration, anoxia Risk factors for asphyxia at birth	Role-playing on the topic : at-risk pregnancies, management by MW or TBA
2	Examination at birth Assess : breathing, crying, skin colour, pulse	Freeing the airways and stimulation	Individual practice on dummies
3	The role of breathing ; gaseous exchanges O2-CO2 The effects of oxygen Consequences of ineffective breathing	Assisted ventilation M to M, mask, mask and bag Oxygenation : tube, mask External massaging of the heart	Practice on dummies
4	Heat loss in newborns : mechanisms, dangers Entrance points for infection	Techniques for conserving heat Aseptic nursing care	Bathing the newborn Care for the navel
5	Monitoring after nursing care : hypoglycaemia, heat, asphyxia	Feeding newborns MCH	Discussion Which baby can stay with mother Which babies must be kept under observation
6	The process : evaluation, decision-making, action	The organization chart	Role-playing on the topic

THE FRAGILE NEWBORN

by Jacques LALANDE

Management and monitoring of fragile newborns is based on the following criteria : the gestational age, weight, intrauterine growth and the obstetrical context.

Gestational age is a most important concept. Its estimation is based on the date of the last menstruation ; this shows the importance of highly accurate questioning and record-keeping. In well-equipped countries, early echography is increasingly resorted to : when performed before the 18th week (= 4 months of pregnancy) it corroborates the term to within one week.

THE PREMATURE NEWBORN

Definition

Prematurity was formerly defined by weight. Actually, the main risks are connected with immaturity, which is far more dependent on gestational age, or term, than on birth weight. The premature is a baby born before 37 weeks of amenorrhoea. The younger the child, the more fragile he/she is :

- between 34 and 36 weeks : moderate risk ;
- between 32 and 34 weeks : serious risk ;
- below 32 weeks : very serious risk.

Aside from the date of the last menstruation (plus early echographic findings), some physical signs visible at birth are indicative of prematurity : small height and low weight — in other words, good body proportions — thin face, thin, soft skin, occasionally oedematous limbs, thick, abundant vernix, soft ears, small nipples, plantar creases, apparent only on the anterior 1/3 or 2/3.

Neurological behaviour is also indicative of prematurity. The most accurate signs are posture, foot/leg and popliteal angles, straightening of the head and trunk, the crossed extension reflex (see table 3).

Size is an important point in prematures. To assess it, criteria for maturation must be compared with norms for anthropometric measurements — weight, height, head circumference — with reference to the standard curves for each of these, when they exist (see figure 12). A coefficient of correction should be used to compensate for ethnic differences by considering the average weight of newborns in the specific group (see figure 13).

Requirements

Prematures have inadequate stores of nutrients : there is a risk of hypoglycaemia and hypocalcaemia. They are immature, and constantly risk hypothermia. They must be warmed up immediately : in case of resuscitation, a source of heat must be kept ready, and used while the different procedures are performed.

There is always a risk of respiratory distress, the seriousness of which is inversely proportionate to size (hyaline membranes in smaller babies) ; distress may be only temporary in larger children.

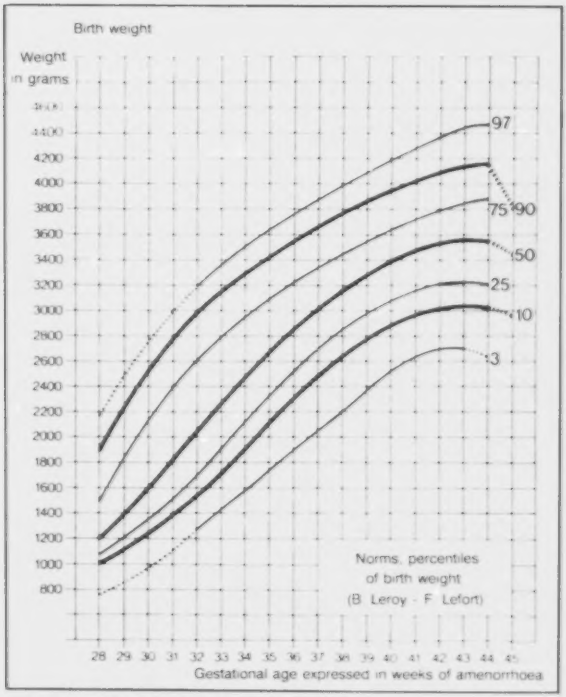

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Figure 12 : Weight-Gestational age
Source : B. LEROY and F. LEFORT In : Revue Française de gynécologie, 1971, 66, p. 6-7.

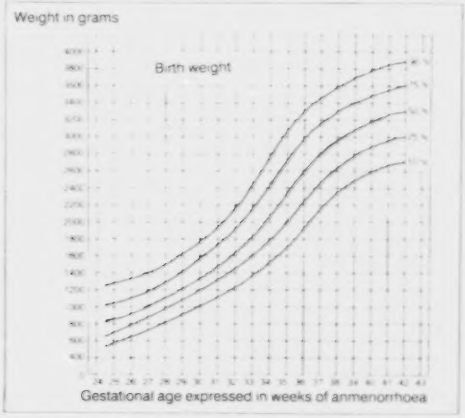

Figure 13 : Weight-Gestational age
Source : L.O. LUBCHENCO, C. HANSMAN, M. DRESSLER and E. BOYD In : Intrauterine growth as estimated from liveborn birthweight data at 24 to 42 weeks of gestation, Pediatrics, 1963, 32, p. 793-800.

Haemorrhagic disorders are frequent, and serious when they are intracerebral (meningeal or intraventricular bleeding). They are always aggravated by initial difficulties such as lack of oxygen or heat loss.

Jaundice is not rare, and is more severe than in at-term infants (apart from haemolysis owing to foeto-maternal blood incompatibility).

Furthermore, the premature has a poor ability to ward off infection.

What to do

The premature is warmed up, using locally available means : the mother's warmth or an incubator, a heater, suspended basket and plastic blanket.

The infant is fed according to his/her capability : breast or bottle-feeding, or cup, continuous or intermittent orogastric feeding, using the mother's milk when it may be drawn, a formula, or fortified milk if it is available.

Surveillance of the skin colour, breathing and heartbeat, temperature, faeces, mictions, abdominal bloating and neurological behaviour is required.

Precautions

Strict cleanliness must be observed. It is important to keep in mind that the premature's future is with his/her mother, and should best be fed the mother's milk and returned to his/her family as soon as possible. Often there is a question of whether transferral of the premature to a specialized neonatology unit is advisable. For a gestational age of 34 to 36 weeks, transferral is only recommended when pathological signs occur (polypnoea, wimpering or repeated apnoea, grunting, occurrence of cyanosis indicative of respiratory distress, refusal to drink, vomiting, abnormal movements). Before 34 weeks of age, strict monitoring by a competent paediatric team is required. The decision then depends on local conditions. One thing is sure, however, the mother's presence or proximity is the best protection against most of the dangers that threaten the premature. This is why so-called "Kangaroo" units, in which mother and child are hospitalized together, are so valuable.

THE SMALL-FOR-DATE NEWBORN

Small size for date, or hypotrophy, is linked to slowed or even arrested antenatal development. This is also called intrauterine growth retardation (IUGR).

Definition

Hypotrophy is said to be moderate when the newborn's weight is below the 10th percentile of the reference curves, and severe when the weight is below the 3rd percentile. But just as for prematures, reference curves cannot be applied to all population groups without adjustment.

Assessment of hypotrophy requires reference to the term of gestation : the child is either pre-term before 37 weeks or near-term between 37 and 41 weeks of gestation.

In the absence of prematurity, a birth weight under 2,500 g constitutes a sign of moderate hypotrophy, whereas if it is under 2,000 g, hypotrophy is severe.

Twins are often relatively small for date, and should be the object of the same precautions, particularly since they are often born before term.

The risks are connected with a lack of the nutrient stores required for immediate metabolic functioning, as well as with the aetiology of the IUGR.

What to do

The risk of heat loss is not as great as for prematures, but it should be kept in mind, and a normal temperature maintained. Hypoglycaemia is combated by providing satisfactory nutritive intakes. Any jaundice may quickly cause damage (kernicterus), owing to the frequency of deficiency-caused hypoproteinaemia, and should therefore be watched for attentively. Lasting depression of the immune functions may be observed in small-for-date babies as well as in prematures, and special attention should be paid to the prevention of infection.

Determining the aetiology

Family medical history

In some families constitutional hypotrophy is frequent outside of any pathological context.

Mother's medical history

Smallness for date may be caused by reduced placental functioning, particularly in case of maternal high blood pressure or a pretoxaemic state (the main complication of which is pregnancy-related nephropathy), as well as by maternal malnutrition, in which it is particularly severe, or chronic maternal intoxication (by tobacco, alcohol or drugs).

Fœtal medical history

It is also occasionally the product of antenatal pathology, or of embryopathy during the first trimester of pregnancy. The baby should be examined for any malformations, deformities suggestive of an abnormal caryotype, visceral anomalies (affecting the heart and kidneys in particular). In these cases, echography is specially valuable.

The problem may also be caused by a foetopathy ; that is, by an aggression suffered by the foetus during the 2nd or 3rd trimester of intrauterine life. This is most often a viral infection or parasitosis, which may be diagnosed by comparative serological testing of mother and child : usual tests generally include rubella, CMV infection, hepatitis, syphilis and toxoplasmosis.

However, many hypotrophies have no obvious cause.

Prognasis

It is difficult to determine a prognosis for small-for-date babies. The short-term picture is often much more favourable than for prematures. Weight rapidly begins to increase. Small-for-date babies may soon be fed and stay with their mother. In the longer run, however, only regular monitoring of growth can indicate whether the child's measurements have completely caught up with those of other children of the same age.

Retarded psychomotor development and the occurrence of patent neurological sequellae mostly occur in case of complications at

birth : it is a fact that IUGR may cause sudden, acute foetal suffering (AFS) during delivery. Whenever IUGR is diagnosed in an expectant mother, then, it is important that she be monitored very attentively, and increasingly closely. Whenever possible, she should be referred to a well-equipped centre before delivery, for surveillance both of her own state, and of the behaviour and vitality of the foetus (using echography and monitoring of the foetal heartbeat), and to provide adequate birthing conditions.

CARE FOR FRAGILE NEWBORNS

Cleanliness

It applies to the personnel, mothers and newborns. The personnel must learn to be clean : to wear clean overgarments, and carefully wash their hands and forearms, to the elbow, using ordinary white soap and water, and dry them either with a piece of cloth or with disposable paper towels.

Mothers should protect themselves against infection ; personal cleanliness is an important part of this. Bathroom facilities with showers should be easily accessible, toilets should be kept clean and disinfected, and changes of linen should be available.

For the newborn, it should be remembered that the best protection against infection is afforded by the child's own mother. If she is healthy, she transmits a colony of non-pathogenic germs, to which the infant is immunized, since throughout gestation he/she has received maternal immunoglobulins with a small molecular weight (IgG), which easily cross the placental barrier. Breast-feeding continues this action by transmitting surface antigens (IgAs), polymorphonuclears and B lymphocytes, which are deposited on the baby's respiratory and digestive tracts, and induce the production of antibodies against possible contaminants : germs, viruses and parasites. Above all, and especially if he/she is fragile, it is preferable for the newborn to be kept close to his/her mother — in the same bed or on the same nat, or in a cradle, a heated box, or even an incubator close to her — and for direct contact and breast-feeding to be encouraged whenever possible.

Infants should be washed daily ; bathing, and wetting of the navel are not dangerous. When no bath-tub or hot running water is available, the child should still be washed daily. This is also recommended for babies in incubators : glass bottles containing boiled water (500 ml infusion bottles, for instance) may be prepared, one per child. The child is first soaped, using the hands, then rinsed, using a moist wad of cotton.

The navel is cleansed daily, using a little alcohol, and may be covered with a sterile compress. The face, eyes, nostrils and ears are cleaned with a wad of cotton moistened with 9 per thousand-strength physiological salt solution.

The inside of the incubator should systematically be washed, using soap and water.

TEMPERATURE

Heat loss is a major cause of death in fragile newborns. Hypothermia (body temperature below 36.5 °C) aggravates respiratory ailments and acidosis, making the nutritive process impossible. The infant does not gain weight, since all of the energy contained in his/her diet is used in the attempt to heat his/her body.

The baby's temperature must be maintained at 37 °C. To do so, the atmosphere must be heated to 30° for babies weighing less than 2,000 grams, and higher still for extremely premature babies. But even in hot climates, the temperature may drop below 25 °C at night.

Advice

A healthy but small infant (weighing over 2,000 grams) should be clothed and kept with his/her mother, whose body heat warms the child up if the temperature goes down. If the room temperature is under 25°, or if the mother is ailing, the child is covered or placed in a heated box.

As a rule, a child with respiratory difficulties should be kept naked so that breathing and skin colour may be watched. This means he/she must be kept in an incubator or a heated cradle (at 32° to 34°).

When a very small infant is kept in an incubator, naked, a temperature of 31° to 34 °C must be maintained. 30° to 32° are required if the baby is dressed and placed in a cradle or a heated box.

If no incubator or heated box is available, the best source of heat is the mother (or possibly another member of the family), who holds the child to the warmth of her body, under her own clothing. If this is not feasible all of the time, the child should be clothed, his/her head covered with a cap, and placed in a small box within a wrapping of cotton, cloth or clean, dry paper, away from any draught. A sheet of transparent plastic may also be used to cover everything but the head, for proper breathing.

The baby should not be left alone, unwatched.

FEEDING

The best milk for a newborn is practically always his/her mother's. However, there may be some quantitive difficulties in milk production : if the mother is tired, ill, poorly nourished herself, or if the newborn is very small, too weak to suck, or separated from the mother because of some problem.

New-term infant

The diet of a near-term or slightly premature infant (gestational age over 34 weeks), depends on his/her state.

A baby who is capable of suckling, is put to the breast very early, within the first three hours of life : early sucking on both breasts helps to start lactation. The child should be kept with the mother at all costs, and it should be possible for her to nurse at any time of day or night. No supplement is needed.

If the child is unable to suck directly, the milk may be pressed out and allowed to run into the mouth, a drop at a time, or else a hand milking machine may be used, and the child fed the breast milk from a cup.

In case of artificial feeding (because the mother is sick or definitely unable to nurse), a powdered milk infant formula is used, in reconstituted form (one measuring spoon for 30 grams of water).

The ration is 70 ml/kg on the first day, and 80, 100, 120, 140, 160 on the following days, rising to 180 ml/kg at the end of one week. This amount is divided into as many meals as necessary, often 8 to 10 a day, with no supplements other than vitamins.

True premature infant

In true prematurity (gestational age under 34 weeks) the child is often unable to suck. And yet, breast milk is his/her only chance of survival. His/her stomach cannot hold much food. The number of feeds must then be increased to 10 to 12/day, and the milk given by the mother herself, using a dropper or a cup (5 to 10 ml at a sitting). The ration is increased very gradually, by 10 grams a day/kg, and reaches 180 to 200 ml/kg in two weeks. Stomach intubation with a continuous orogastric sound may also be used, but with a very slow flow, of 5 to 10 ml an hour, for example, depending on the baby's weight.

A supplement is given by venous perfusion only if weight loss is excessive during the first days (over 10 %) and if the baby vomits.

All babies require supplements of 50 mg/day of vitamin C and 1200 U/day of vitamin D, starting at birth, irrespective of their weight or term. A daily dose of 1 ml (= 35 drops) of multivitamin hydrosol is administered.

Dysmature children

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Dysmature (that is, small-for-date) children run a risk of hypoglycaemia because they lack stores of glycogen and fat, especially during the first two days. They must be fed early, before the 4th hour. Sugar may be added to their diet in the form of dextrin maltose (3 grams in 100 ml of water) or of a 5 % or 10 % glucose solution (5 or 10 g of sugar in 100 ml of water). 10 ml of either solution is fed to the child at each feed, in addition to breast milk. When feasible, glycaemia is monitored using a dextrostix strip. Glycaemia is normally above 0.40 g in newborns (2.2 mmol/l).

COMMON PROBLEMS

Digestive problems

Vomiting

If vomiting occurs at the first feed, with saliva on the lips, the permeability of the upper digestive tract should be checked. A syringe test is performed to investigate the eventuality of oesophageal atresia. Examination assesses the colour of the vomit (if yellow or green it indicates occlusion), any signs of infection, poor hydration or neurological signs.

Evacuation of the meconium and the weight curve must be investigated.

If no severe pathology seems to be involved, the mother should be given advice and assisted during the next 1 or 2 feeds. She should be comfortably settled, in a half-seated position, with the child lying next to her in an erect position, protected against any cold air. He/she is helped to find the nipple ; the pace of sucking and the amount of milk taken are checked, and the mother is shown how to burp the baby, who is then placed on the stomach, arms up, on a mattress raised at the head end.

In case of artificial feeding, a thickener such as gelopectose (1 teaspoon for 100 ml of water, heated before the proper amount of milk is added) or gumilk (one 1 g measuring spoon for 100 ml of water) may be tried. The same advice is given for the rest of the procedure.

Diarrhoea

Diarrhoea is exceptional in breast-fed babies. It has three main causes : a nursery epidemic (usually viral rather than bacterial), formula milk too rich in saccharose (sweetened condensed milk, for instance), preparation of bottles using water unfit for drinking.

It results in weight loss and a risk of dehydration, bloating and a risk of vomiting, frequent, watery stools.

Treatment is a question of ceasing artificial feeding and not giving any antibiotics. An oral solution (of the WHO type) is administered for 24 to 36 hours, after which feeding is gradually resumed, using breast milk when possible (from a milk bank, or milk donated by another mother). Following recovery, some formula milk is slowly reintroduced, and the mother is given very clear advice : boil water, dilute milk correctly, respecting the proportions, use extremely clean utensils.

The composition of the WHO solution is as follows. For one liter of potable water (boiled, filtered water) :

- **sodium chloride (ordinary table salt) = 3.5 g ;**
- **sodium bicarbonate = 2.5 g ;**
- **potassium chloride = 1.5 g ;**
- **glucose = 20 g.**

Constipation and bloating

Constipation and bloating are very frequent in severe prematures. The abdomen is then very taut. There may be difficulty in breathing, or in drinking, with occasional vomiting. The child's state is satisfactory however. Stools are infrequent and scant. This is due to weakness of the abdominal wall muscles.

The child should be helped to defecate : never administer lavage, but apply stimulation, both by introducing a thin, flexible probe into the anus and gently moving it, and by gentle massaging the abdomen with circular motions of the palm of the hand. Remember, thermometers are very rigid, and contribute to ulceration.

Bloody stools

This is a rather frequent occurrence in prematures and small-for-dates, and is not synonymous with necrotic, ulcerizing enterocolitis (NUEC). There are many other causes. One is common ulceration caused by a thermometer, and anal fissure exuding red blood. The cause must then be investigated directly, using a flashlight. It may be diarrhoea with mucus and streaks of blood, or haemorrhaging colitis and an early manifestation of intolerance of the proteins contained in the formula milk.

These different situations require correct analysis and above all, precautions with respect to hygiene and diet. The anus must

receive treatment, in the form of gentle cleansing and a healing ointment. If there is diarrhoea with streaks of blood, an infectious aetiology is sought (coproculture is performed) and oral rehydration implemented, followed by feeding with breast milk and in some cases, an intestinal antiseptic.

As a rule, breast milk is always preferable, and breast-feeding definitely should not be interrupted simply because of bloody stools.

Necrotic enteritis

Necrotic enteritis is much more serious. Anoxia-related problems following resuscitation at birth and infections caught in hospitals — postnatal contamination by contact with soiled supplies or apparatuses, or personnel operating unhygienically — are contributive factors, making it more frequent in prematures.

The picture is one of intestinal obstruction, with vomiting, bloated, painful abdomen, bloody stools and poor general state, in an infected child. X-rays show signs of obstruction : strata of water and gas, with occasional presence of gas in the intestinal wall, seen as lines of tiny bubbles.

This is a very serious condition, and prevention is essential here. It involves hygiene in child care, clean facilities, avoiding the introduction of venous or arterial catheters and exclusive breast-feeding, with no supplements other than vitamins.

Treatment consists of a 48-hour interruption of feeding through the digestive tract, replaced by a venous infusion through a peripheral vein. Another solution is exclusive feeding of a sweetened solution of the WHO type for 48 hours, followed by resumption of feeding, using breast milk exclusively.

The antibiotics given are ampicillin + gentamycin (cf neonatal infection).

There may be extremely serious developments, and rapid death. Complications (intestinal ischaemia or peritonitis) may arise, requiring surgery, which is most delicate. Conversely, when it is treated in time, recovery is possible.

Jaundice

Jaundice is not infrequent. Contributive factors are immaturity of the liver and fragile blood cells, along with the usual causes of haemolysis. For a comparable bilirubin concentration, it is more serious in prematures and small-for-dates, in whom frequent hypoalbuminaemia increases the concentration of free bilirubin. When possible, it is preferable to assay FB (free bilirubin, not bound to albumin : risk starting at 0.7, harmful at 1) and the total protein concentration (normal between 56 and 65 g/liter), along with total serum bilirubin (risk above 180 mg/liter).

Treatment is easy to implement. The first phase involves phototherapy, either by constantly exposing the naked child (necessarily in an incubator or heated cradle) to the light of 6 white or blue 25-watt lamps, at a distance of less than 50 cm, with interruptions for breast-feeding only. An infusion of albumin or plasma is added to this, if the protein concentration is low. Exchange transfusions are

avoided whenever possible. Subsequently, anaemia is combated by the administration of ferrous salts and of foldine, which stimulate the regeneration of red blood corpuscles, since infants with a very low birth weight have constantly depleted stores in comparison with eutrophic at-term infants.

Respiratory problems

Low-birth-weight newborns experience some peculiar difficulties in breathing, and these account for many of their problems during the first hours and days of life. First, the lungs must be emptied of their intra-alveolar fluid, so that it may be replaced by inhaled air, but this does not always occur instantaneously. Next, the chest is too flexible, since the ribs are only partially ossified, and the muscles are relatively hypotonic.

Furthermore, in small prematures (gestational age under 34 weeks) there is the serious risk of a lack of pulmonary surfactant, a substance required to maintain the alveoli open. In this case, there is a diffuse tendancy to alveolar collapse. Gaseous exchanges are hampered.

Newborns normally take 40 to 50 breaths a minute : in case of difficulty, breathing accelerates, rising to over 60, 80 or even 100 breaths. Cyanosis occurs if oxygenation is not satisfactory.

When respiration is not efficient, the child is seen to struggle to breathe. During inhalation the diaphragm descends, creating a depression. If inhalation does not succeed in drawing air into the lungs, this depression affects the soft parts of the chest (intercostal spaces, supraclavicular and sternal concavities), causing grunting.

Simultaneously, the extremely flexible sternum sinks in, while the abdomen swells, in a paradoxical rocking movement. During exhalation, a wimpering sound is heard. The vocal cords contract to hold air in the alveoli. This indicates a struggle, but is also a sign of self-defence. There is also a fluttering of the nostrils (cf table 9).

Table 9

SILVERMAN'S INDEX

Note	0	1	2
Thoracic expansion	satisfactory, synchronized with abdominal inhalation	not synchronized with abdominal respiration	thoracic-abdominal rocking
Intercostal respiratory sounds	0	hardly visible	marked
Retraction of the xiphoid process	0	slight	marked
Fluttering nostrils	0	discrete	marked
Wimpering expiration	0	audible with stethoscope	audible to the naked ear

What to do

Physical set-up

First, make sure the child can be watched : place him/her in an incubator when possible, or in a heated cradle, with his/her chest visible. Breathing and heartbeat are counted. The colour of the body, lips and fingers is observed, and sufficient heat is provided : this is essential. Use of a stomach tube is often quite valuable, to evacuate the excess air accumulated in the stomach because of a tendancy to swallow air. This stomach tube may also be used to feed the child either continuously or intermittently, since babies with difficulty in breathing tire easily when sucking, and there is a risk of food going down the wrong track (into the bronchi). The tube must be introduced through the mouth, so as to avoid obstructing the nostrils, and its position in the stomach checked using the syringe test. It is preferable to place the child on one side or on the stomach, head raised, to avoid reflux of the contents of the stomach and wrong track.

Aspiration

Newborns do not breathe through their mouth, but through their nose. Care must therefore be taken to maintain the nostrils open. In fact, some cases of respiratory distress are caused by nasal obstruction only. Permeability may be attained in two ways : frequent, systematic instillations of physiological salt solution (9 per thousand isotonic salt solution) or cautious, very gradual, gentle aspiration using a 2 to 2.5 mm-wide probe.

Oxygenation

Cyanosis is an indication of a gaseous exchange problem : neither oxygenation of the blood nor elimination of carbon dioxide is adequate. There is a risk of acidosis and of vasoconstriction of the pulmonary vessels, with poor pulmonary irrigation and aggravation of respiratory distress. Cyanosis, however slight, is therefore undesirable.

Too much oxygen is harmful, however. Particularly for a premature, and the danger is proportionate to immaturity, owing to a very serious risk for the eyes. Circulatory disorders may develop in the retina, causing blindness (this is retrolental fibroplasia). Administration of oxygen is based on the colour of the child's skin ; as soon as cyanosis disappears, oxygenation is sufficient. When measurement of O_2 is feasible, a 25 % concentration is usually considered satisfactory. Theoretically, if this concentration is exceeded for more than 4 to 6 hours, measurement of partial O_2 pressure in the arterial blood is required, using either a blood specimen or transcutaneous assay of PaO_2 or of saturation.

The risk is not the same for an at-term or near-term infant, but excess O_2 is still a threat for the broncho-alveolar epithelium. If the concentration exceeds 50 %, and above all if oxygenation lasts several days, it may contribute to the development of a very serious disease, ventilation-caused bronchopulmonary dysplasia.

When supplying oxygen, nasopharyngeal intubation may be a source of local irritation and contamination : a rubber funnel or, better still, a sort of plastic bell placed over the head — a Hood —, with an entrance for oxygen and an exit for air (and CO_2), should be preferred. The concentration of O_2 ($Fi\,O_2$) within this space can easily be measured. The total flow within it must be sufficient : at

least 5 liters per minute of either pure oxygen or of a well-proportioned mixture of oxygen and compressed air.

Physical therapy

In immature newborns, the airways are narrow and overly flexible, while the muscles at work in ventilation and the abdominal muscles are less active, and the baby does not know how to cough properly. This results in a very frequent risk of congestion of the airways. There are several remedies for this.

First, the baby's position is changed every 2 to 3 hours, to avoid the development of less well ventilated areas within the lung (atelectasis). Next, gentle pharyngeal aspiration is performed through the nose or mouth, to start up the coughing reflex. Tracheobroncheal drainage is a three-phase process. First, vibrations are set off manually in the chest, either globally or segment by segment, to set the secretions in motion, after which they are pressed out by exerting strong two-handed pressure during expiration, in harmony with the child's breathing. Last, the coughing reflex is stimulated either by aspiration of the pharynx or by finger pressure on the trachea at the sternal concavity.

Special cases

Apnoea

In prematures, apnoea lasting more than 10 seconds is a cause of concern ; the longer it lasts, the more serious it is, since it may slow down the heart : below 60 beats a minute serious problems are to be feared, with modifications of skin colour (cyanosis) and of the child's muscle tone.

The baby should then be stimulated by tickling the skin and moving the body. Caffeine is given orally : 2.5 mg/kg/24 hours (= 5 mg of citrated caffeine).

Beware : simple apnoea is not reason enough to administer oxygen.

Pneumothorax

Pneumothorax is caused by very active resuscitation at birth, particularly when insufflation is performed by mouth or using a mask and bag, without sufficiently clearing the airways beforehand. It may also be due to inhalation of amniotic fluid, especially if the fluid contains meconium, or to improper tracheal intubation (tube too low).

More rarely, pneumothorax may originate in other causes of distress such as delayed resorption or a pulmonary infection. Diagnosis is clinical, in case of respiratory distress with distension — occasionally asymetric — of the abdomen and chest. Percussion and auscultation produce an exaggeratedly resounding effect, the heart seems far away, and is barely audible.

When an x-ray can be done, it shows hyperlucency on one side, with a retracted lung and a mediastinal deviation. In pneumomediastinum, a pale outline shows the contours of the heart.

If the pneumothorax is moderate and well tolerated, puncture need not be done immediately, but the necessary equipment must be prepared, since sudden deterioration is always to be feared.

When respiratory distress is manifest, the decision is clear : puncture must be performed, using a large syringe on which a

large needle is mounted. This is the first procedure to be performed in case of apnoea or arrested circulation. Afterward, if it is successful, a drain may be placed in the pleural cavity ; it is attached to a tube immersed in a bottle of water, to avoid any re-entry of air, and is left in the cavity as long as air bubbles form around the tube.

Development

Hyaline membranes disease

The subsequent developments depend on the cause of the respiratory disorder. Some are very serious : the hyaline membranes disease in prematures with a gestational age of less than 35 weeks requires high concentrations of oxygen and constant assisted ventilation. Improvement may occur after approximately four days, but death is frequent.

Infection

Pulmonary infection may result in severe distress. This emergency is diagnosed on the basis of infection and the discovery of deteriorated polymorphonuclears and of germs on a slide with a Gram-stained specimen of gastric or tracheal fluid.

Treatment is urgent, requiring the most appropriate antibiotics, oxygenation and reestablishment of the haemodynamic balance.

Inhalation of meconial fluid

Massive inhalation of meconial fluid, occurring following foetal suffering and manoeuvres requiring use of instruments generates a risk of suffocating pneumothorax (see above) combined with pulmonary superinfection. In fact, the best treatment is preventive : it involves the immediate aspiration of the tracheal orifice using a well-calibrated sound (ch 10 or 12, like the ordinary one used for oesopharyngeal aspiration), with physiotherapy for all children born in meconial fluid.

The other causes are usually much less serious, and the process may take a positive course. Delayed resorption of alveolar fluid (DRT) may occur in any newborn, but it is more frequent in low birth-weight babies or following caesarean section. Signs are very rapid breathing, slight cyanosis, often relieved by crying, and diffuse greyness on x-rays. Inhalation of clear amniotic fluid may also cause pneumothorax, and requires monitoring for several days.

These two problems usually take a positive course within 12 to 36 hours. Treatment involves additional oxygen dosed according to the colour of the child's skin (the plastic Hood is very practical), feeding through a stomach tube, continuously and with the child on a slant to avoid any reflux (on an oblique table, head up) when feasible. If signs of congestion are heard during auscultation (inhalation), light physiotherapy is practiced. If ausculatation findings are apparently normal (DRT), tranquillity is the best thing for the child, who may recover quickly and completely.

Neurological problems

Convulsions

Convulsions are indicators of suffering in the brain cells, the causes of which may be extremely varied. They are usually evidenced by a few signs, the recognition of which is essential. There is sudden stiffening of the neck and limbs, with the trunk in hyperextension, set eyes and pallor or cyanosis ; there are abnormal, rhythmic movements of the limbs or of the hands only,

on one or both sides, occuring in short bursts and not modified when the limb is held. There may be prolonged apnoea with stiffness.

Epilepsy is characterized by the alternation of paroxystic phases (jerking limbs) and of hypotonic periods with impaired consciousness.

Some tests must be performed immediately. They include testing for hypoglycaemia (assay of sugar, dextrostix) and hypocalcaemia (assay of calcium, when feasible). Meningeal haemorrhage or severe infection with meningitis may be diagnosed by lumbar puncture.

Treatment includes several procedures : aspiration of the pharynx, oxygenation in case of cyanosis, assisted ventilation or mask if apnoea occurs, peripheral venous infusion of glucose (standard solution enriched with glucose) if hypoglycaemia is detected and persists. When hypocalcaemia is detected it is treated (see technical note).

The drugs called for are valium (0.5 mg/kg, intravenously, IM or rectally (highly effective), which may be repeated one hour later, gardenal (0.01 to 0.02 g diluted in physiological salt solution, either in IV : a slow injection lasting 15 to 20 minutes, or in IM, wait 48 hours before repeating).

The child should be kept under strict surveillance, since there remains a risk of apnoea.

THE FUTURE OF SMALL, FRAGILE BABIES

These small, fragile babies may grow normally and even rapidly, and become perfectly strong individuals, but they do run a greater risk than others of having to overcome some handicaps, and these should be constantly kept in mind.

Neurological handicaps are an eventuality in the severely premature, who almost always suffer from coagulation disorders, which may in turn entail intracerebral haemorrhaging. Once the gestational age of 31 to 32 weeks is reached, however, the latter is much less frequent.

The other plausible neurological risks are generated by perinatal problems, especially in children having suffered from intrauterine growth retardation (IUGR). If a long period of chronic foetal suffering is followed by a phase of acute foetal suffering during birth, with severe hypoxaemia, there is a great risk of cerebral vascular disorders. It is absolutely necessary to take every precaution, during childbirth, for the immediate, effective resuscitation, in the delivery room itself, of a fragile newborn.

Digestive or respiratory difficulties are theoretically temporary. Infants have an enormous potential for growth and recovery. But above all else, these children are threatened by the vicious circle of respiratory diseases-diarrhoeic diseases and malnutrition. They must be followed up attentively, and their parents given appropriate advice, through regular attendance of consultations.

Perhaps the worst of all, in the last analysis, are the emotional and psycho-social handicaps. The child's life is with his/her family, and future happiness ultimately depends on how he/she adjusts to the home environment after the difficult neonatal period. Bonds between mother and child, parents and children must therefore be encouraged, and separations caused by sophisticated medical care kept to a minimum, while maintaining breast-feeding or, when it is impossible, feeding by other members of the family, using a dropper or cup.

In industrialized countries emphasis has tended to focus on the technicization of care in specialized centres, where the newborn is taken away from his/her family. There is now a better understanding of how harmful this is for the child's development, particularly in economically and culturally underprivileged contexts. This has led to a tendancy to reduce this separation to as short a period as possible, and to encourage parents to participate in care, either at home or in neonatal care centres. This avoids many extremely unfortunate situations in which parents and child do not get along well or understand each other, the outcome of which may in some rare cases be rejection and abuse, or a battered child, and more frequently, behavioural disorders in the small child : disorders affecting sleep, appetite, control of the sphincters, followed by difficulties in adjusting to school and later in learning a trade.

Fortunately enough, this "technological" approach is usually inconceivable in developing countries, and care is constantly provided to the mother-child dyad, with no separation. Ongoing education of people in contact with fragile children as to their basic needs should help these to catch up with children of their age, and to become flourishing youngsters.

THE HYPERTROPHIC NEWBORN

Simple hypertrophy designates any child born of a normal mother, whose weight exceeds the limits of the reference curves ; for instance, an at-term infant with a birth weight over 4,000 g, a baby born at 38 weeks and weighing over 3,800 g, one born at 36 weeks and weighing more than 3,500 g. These children are often harmonious in appearance, tall, and not obese.

Risks in these cases include hypoglycaemia, hypocalcaemia and severe weight loss, since the child's metabolism is more active, requiring more water, sugar and calcium. Occasionally polyglobulism is observed as well (over 6 million red blood corpuscles, over 23 g of haemoglobin), but it usually is not particularly dangerous.

Feeding should be begun at once, and the child put to the breast in the delivery room ; if this is impossible, sweetened water is given, but at a low concentration (3 or 5 % maltose or sugar solution). Glycaemia is assayed at regular intervals, if possible. The child should be fed milk very rapidly (breast milk or formula with no added sugar). Milk provides the proteins needed for efficient glyconeogenesis, as well as calcium, which is essential. Administration of vitamins is begun on the first day (sterogyl : 3 drops, or multivitamins : 1 ml or 35 drops).

Diabetic mother

When born to a diabetic mother — that is, to a woman whose diabetes could not be satisfactorily corrected during pregnancy — the hypertrophic baby is overweight (using the same criteria as for simple hypertrophy), and has a very characteristic appearance : puffy face, infiltrated shoulders and neck. Unlike hypertrophic infants, these babies are not unusually tall.

There are many risks, spread over a period of nearly 2 weeks. There may be early or, occasionally, delayed hypocalcaemia, evidenced by trembling, agitation, insomnia and sometimes convulsions. Hypoglycaemia sets in early : in 1 out of 2 cases it is under 0.30 g, and once out of 5 it is below 0.10 g. It may last several days and be very difficult to combat. Hyaline membranes disease caused by lack of surfactant represents a major risk for a premature with a diabetic mother. Hyperbilirubinaemia-caused jaundice, linked to increased haemolysis owing to hyperglobulism and hepatic immaturity is another risk.

To avoid these complications, glycaemia should be monitored when possible (using reactive strips when available). Feeding is started rapidly (using breast milk or formula), with added carbohydrates (maltrinex, 5 % dextrin maltose, 3 % caloreen) and calcium (Ca gluconate, orally = 1 g/24 hours).

When feasible, continuous feeding through the stomach is implemented (using a tulip-shaped feeding tube or a pump, when available). If the child's glycaemia remains low, it is possible, but not necessarily desirable, to set up an intravenous infusion of 10 % glucose solution : 100 ml/kg/24 h, in a peripheral vein. Care must be taken to avoid its sclerotic action on the vessels, and to proscribe administration of 10 % glucose solution by an umbilical catheter.

TECHNICAL NOTE

Standard solution for infusion in newborns

To a 250 ml bottle of 10 % glucose solution, add : 2.5 ml of 10 % sodium chloride, 3 ml of 10 % potassium chloride and 15 ml of 10 % calcium gluconate.

The fluid ration is calculated in ml. During the first two days it should not exceed 80 to 100 ml/kg/24 h. It is increased gradually, reaching 120 ml/kg on the third day, 130 ml/kg at 4 days, 140 ml/kg at 5 days, and 150 to 200 ml/kg on the following days.

Attention : half of this ration must be ingested through the digestive track, the other half venously, and breast milk given through the digestive track is always be preferred for digestion, as rapidly as possible : the child requires nourishment.

Treatment of hypoglycaemia

In at-risk infants, prevention involves early feeding, enriched with 3 % dextrin maltose sugar or 5 or 10 % glucose solution.

Treatment is as follows : when blood sugar is between 0.20 and 0.40 g, continuous feeding through the stomach (using a tulip-shaped feeding tube or a syringe pump) of 50 ml containing 40 ml of breast milk or formula + 10 ml of 10 % glucose solution. Glycaemia is monitored every three hours.

The ration is 80 ml/kg on the first day. It is increased by 10 ml/kg a day, until it reaches 180 ml/kg.

If blood sugar drops below 0.20 g, and is not corrected by gastric feeding, proceed with continuous venous infusion, first using standard solution (see above).

If hypoglycaemia persists, the standard solution is enriched with additional glucose. A 250 ml bottle is taken, from which 60 ml are removed and replaced by 60 ml of a 30 % glucose solution, producing a 15 % glucose solution (the highest concentration posssible for the venous route).

It is infused slowly, at 10 to 15 ml an hour, depending on the child's weight and age, on the basis of the fluid rations given above, and breast milk is given as soon as possible.

Treatment of hypocalcaemia

The danger level for calcaemia is less than 60 mg/litre. When it is between 65 and 80 mg, oral treatment is given. Below a figure of 65 mg, intravenous treatment is required.

Calcaemia between 65 and 80 mg : 5 ml/kg of 10 % calcium gluconate, spread over a 24-hour period, in addition to the normal diet. That is, for a baby weighing 3 kg = 3 teaspoons ; weight 2 kg = 2 teaspoons ; weight 1.5 kg = 1 1/2 teaspoons. This is completed by either 5 drops of sterogyl, 10 drops of dedrogyl, or 2.5 ml of multivitamin hydrosol.

Calcaemia below 65 mg : infusion of standard solution, to which 5 ml of calcium gluconate is added per 100 ml. The ration is 100 ml/kg of solution over a 24-hour period. On the following day, calcium gluconate is given orally = 5 ml per kg. On the third day, the dose is halved = 2.5 ml per kg. Vitamin D is also given as above.

On the fourth day, the normal daily dose of vitamin D is given : sterogyl, 3 drops/day or multivitamin hydrosol, 35 drops/day along with a normal diet for the child's age.

The child is fed breast milk, since hypocalcaemia is actually only seen in children fed infant formula.

SPECIAL CASES

THE INFECTED NEWBORN

CLINICAL NEONATAL INFECTIONBY

by Mohamadou FALL

Neonatal infection is particularly frequent in Africa ; it is the main cause of neonatal mortality in many developing countries, and is responsible for 47 % of entries in the neonatal intensive care units connected with the paediatric department of the Lomé university hospital. Mortality there was 40 % in 1988 (1).

Contributive factors are related to the environment (traditional practices, poor hygiene), the course of pregnancy (premature rupture of the membranes) and constitutional fragility (prematurity, small-for-date, dysmaturity).

90 % of the neonates hospitalized for neonatal infection at the Albert Royer children's hospital in Dakar come from the overpopulated suburban areas with a low socio-economic level, and 40 % were born at home. Genital infection, premature rupture of the membranes (PRM) are noted in more than one third of cases, low birth weight and prematurity in 20 % of cases. Another finding : males predominate, with 2 boys for 1 girl. In most cases, hospitalization had been delayed for as much as 6 days.

Clinical signs

At first, the symptoms are not spectacular : refusal to suckle, digestive disorders such as bloated abdomen, diarrhoea and vomiting. Bloated abdomen is frequent, and is seen in more than half of cases. There is also unsatisfactory neurological functioning (agitation, modification of crying, little spontaneous activity and disordered tone), and respiratory disorders.

If no treatment is given, the full picture includes highly suggestive signs such as abnormally low or high temperature, convulsions, or even true epilepsy. The child may have bouts of pallor and cyanosis, and suffer from jaundice and shock.

Physical examination shows hypertonia more often than hypotonia, with abated or nonexistent archaic reflexes, more or less diffuse infiltration of the skin (cellulitis, pustules, abscesses). An enlarged liver is frequent, whereas the spleen is rarely enlarged.

In severe forms, purpura and sclerema are indicative of a poor prognosis. In most patients, the navel is dirty, with signs of inflammation.

Diagnosis

The diagnosis is suggested by poor neurological behaviour in a newborn with digestive disorders such as bloating and vomiting ; examination finds pallor, respiratory distress and disturbed tone.

The bacterial agents are usually isolated in haemocultures, taken from umbilical specimens, and in the cerebrospinal fluid. Most are staphylococci, gram-negative bacilli and streptococci.

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(1) Symposium sur la problématique des soins intensifs dans les pays en voie de développement, APAMF-CIE, July 1989.

Treatment and course of the illness

First intention antibiotherapy presently uses ampicillin-gentamycin at the usual doses : ampicillin, 100 to 200 mg/kg/day and gentamycin, 3 to 5 mg/kg/day, both in intramuscular injections, twice daily.

This initial antibiotherapy, and more particularly the route, may be modified, depending on the germ isolated and the course of the illness. Intravenous infusion may be required if the haemodynamics are poor, and provided it is materially feasible.

In the short term, many complications may occur. The most serious are bleeding, apnoea and convulsions. These frightful complications result in the death of over one third of patients.

In conclusion, neonatal infections are particularly serious. They are difficult to manage in the African context, because health infrastructures are inadequate, and effective antibiotics difficult to procure and expensive.

Emphasis should be placed on prevention, which involves raising the overall standard of living, satisfactory education for health and improved monitoring of pregnancies, along with strict hygiene during childbirth and care for newborns, and last, early detection of transplacental infections.

EARLY DETECTION OF TRANSPLACENTAL INFECTIONS IN MATERNITY UNITS

by Christiane HURAUX-RENDU

Transplacental contamination is the main cause of infection in newborns. Early detection of newborns at risk of transplacental infection is important, so that close monitoring and preventive action may be implemented, before the dramatic situation described above takes its toll.

Contributive factors

Cognizance of the obstetrical history may yield information on a urogenital infection during pregnancy, prolonged rupture of the membranes, lasting over 12 to 24 hours, or abnormally long duration of labour.

Some signs of transplacental infection are more directly suggestive : maternal fever of 38°C or more during labour, prematurity and acute, unexplained foetal suffering, tainted, dark, foetid amniotic fluid.

When such signs are observed, and particularly when they are combined with contributive factors, the question is whether to administer routine, "prophylactic" treatment of transplacental infection. It is of course definitely preferable to obtain bacteriological proof. Direct microscopy following Gram staining of the newborn's gastric fluid is a very simple means of evaluating transplacental contamination : the presence of Gram-positive cocci, with their clearcut, short chains, or in diplococci, is strongly suggestive of infection with group B streptococci. But there may also be Gram-negative bacilli suggestive of Escherichia coli or Klebsiella, or small Gram + bacilli likely to be Listeria. If antibiotherapy is judged necessary, it may then be prescribed in accordance with the germ suspected, and this type of prevention seems to be

perfectly justified, in view of the severity and the occasionally lightning speed with which transplacental infection acts, particularly in the case of group B streptococci.

TWO SPECIAL CASES

First, congenital syphilis, the frequence of which is apparently on the rise in some large African cities. Diagnosis is essentially based on the evidencing of syphilis in the mother, since clinical signs of congenital syphilis often do not occur at once. In case of doubt, treatment with 2.4 to 4.8 million U of Benzathine Penicillin may be recommended, if there is a risk of inadequate subsequent medical surveillance of the baby.

As for neonatal tetanus, it must be prevented, essentially by the measures described above : vaccination of pregnant women, sero-vaccination of newborns in case of at-risk delivery. These measures have proved effective in those countries where they are systematically applied.

NEWBORN WITH AN HBV + MOTHER

Chronic carriers of a hepatitis virus are extremely frequent in some countries (sub-sahelian Africa, south-east Asia). Babies may be contaminated at birth when their mother is a carrier of viral particles. The risk of transmission is somewhere around 20 % when the mother has the HBs antigen only, and around 90 % when she also has the HBe antigen. Contamination occurs through the blood and the genital secretions, and therefore affects the newborn during the immediate perinatal period and throughout infancy. Breast milk probably also contains viral particles, but the risk of contamination is extremely low in comparison with the risk during delivery, and is not a contraindication for breast-feeding.

If the newborn is contaminated, there is a risk that he/she will become a chronic carrier, and tend to develop active chronic hepatitis, cirrhosis or primary cancer of the liver (40 % of chronic carriers) at adulthood. Exceptionally, fulgurating hepatitis may occur, rapidly resulting in death. 50 % of severe cases of infantile hepatitis before age one year are the outcome of untreated perinatal transmission.

It is possible to prevent perinatal contamination by seroprophylaxis combined with vaccination : an intramuscular injection as soon as possible, within 12 hours of birth, of 2 ml of specific anti HBs gamma globulin, along with initial anti-hepatitis B immunization using 1 ml of hevac B or genevac B. This vaccination must be repeated at 1 and 2 months, and at 1 year.

This prophylaxis has proved effective. In fact, the real problems are the detection of those women who are chronic carriers of the HBs antigen, and the cost of prevention.

NEWBORN WITH AN HIV + MOTHER

The rapidity of propagation of the human immunodeficiency virus is a source of great concern, especially in some parts of the African continent, but elsewhere as well.

It is still rather difficult to accurately determine the risk of contamination for newborns : it seems to be around 25 and 30 %. Contamination mostly occurs at the end of pregnancy, and is not

influenced by the type of delivery. The virus has been isolated in breast milk, but here again, although there is probably a risk of contamination it is slight and does not justify proscribing breast-feeding, which is otherwise so essential for the survival of children in developing countries. The risk of contamination apparently depends on the severity of the mother's case : it is higher in mothers with AIDS, but may also occur with a seropositive only, entirely symptom-free mother.

Unlike hepatitis B, there is unfortunately no prevention available for newborns at present. The question of whether to perform BCG vaccination arises : it is contraindicated in infected children, and should therefore not be performed in the offspring of HIV+ mothers until it may be determined whether or not they have been infected. This is only feasible at the end of several months, once the maternal antibodies have completely, definitively been eliminated (a definitely negative blood test = non-infected child).

THE MALFORMED, HANDICAPPED NEWBORN

The birth of a malformed baby is always a painful event, raising difficult problems : first, a complete assessment of the existing malformations must be made, keeping in mind the fact that a dysmorphism or external malformation may be accompanied by malformations of the viscera (duodenal stenosis, cardial malformation in trisomy 21, for instance).

At the same time, the aetiology of the malformative syndrome must be investigated. Some causes are relatively easy to imagine, when the picture is typical of a chromosome anomaly or of embryofoetopathy connected with rubella or toxoplasmosis, or of the teratogenic effects of a medication taken early in pregnancy. The diagnosis is confirmed by some specific tests, which may or may not be easily performed, but are always preferable for the next step : establishing a prognosis for the child and for future progeny.

For the child, answers must be found for the parents' questions : what does the future have in store, will he/she be able to walk, talk, "get along in life" ? It is important to understand what a handicap or a malformation means to the family, and this may differ considerably from one culture to another, and from one family to another. Some people are essentially sensitive to the baby's physical appearance, while others are mostly concerned with intellectual development, and still others with his or her motor and functional capabilities.

At the same time, it is important to evaluate the risk of an eventual recurrence, and whether or not the malformation is of a hereditary nature, while taking care not to make parents feel guilty.

Some people are interested in medical explanations of why the malformation developed. All parents must be told of any possible risk for their future children, of any existing screening possibilities, or conversely, as is usually the case, of the completely accidental, non-repeatable nature of the event.

Occasionally parents feel ashamed of their disabled child, and it is important that they be encouraged to express this feeling, after

which they may consider acknowledging the child's existence, naming him/her and ultimately accepting the child as he/she is.

Then, and then only, can mothering practices be begun, and encouraged : bodily contact between mother and newborn, traditional massages, carrying the child on her back and breast-feeding should be encouraged by a warm, unobtrusive team of people capable of providing support and comprehension for the distressed mother.

STILLBIRTH OR NEONATAL DEATH

Over and above tending to the first shock of the family that was expecting life and receives death, the duty of the medical team is to understand : understand the cause of the death, and understand the repercussions on the family. Neither of these tasks is easy : the aetiology of an unexpected death occurring either before, during or after birth is not always self-evident. Every piece of information must be examined : the mother's medical history, examination of the placenta, clinical examination of the baby including measurements, some biological tests (especially bacteriological) and when feasible, an x-ray of the skeleton.

This investigation must be done in collaboration with the team that monitored the pregnancy and performed delivery. When feasible, an anatomical verification is made, since it very often contributes extremely valuable information. All of these examinations should be explained to parents, along with the reasons behind them : the need to determine why this death occurred, so as to avoid its repetition during a subsequent pregnancy. When the results arrive, the parents are seen again, and informed of the findings and of their interpretation.

Psychological support for the parents and their family should not be overlooked : although they do not necessarily express their pain loudly, it is always present.

MULTIPLE PREGNANCIES

The birth of twins or triplets is a special event, one that is both medically and socially unusual.

Social aspects

In some parts of Africa, the birth of twins is experienced as an explosion of life, but also as a sign of excessive fertility. Twins are believed to be especially powerful, unusually close to the cosmic forces, and this explains the ambivalent feelings toward them : they are both revered and feared. They are viewed as potentially dangerous, since they exceed the norms. They are links between the human world and an invisible world, and people generally do not make any outstanding efforts to raise a low-weight twin, judged to be weak.

In other cultures, there is no such reference to the divine aspect, but twins still hold a special position : their arrival is of course experienced as a source of wealth, but one which is still potential, the future of which remains uncertain.

In some cases, when the pregnancy was not desired to begin with, in already large families, the announcement of this multiple birth, which is not necessarily identified during pregnancy, may be a cause of discouragement.

Medical aspects

Twins -not to speak of triplets- are often born prematurely, and have a low birth weight. There may be a considerable difference in weight between the two, and a foeto-foetal transfusion syndrome must be sought : this involves placental vascular anastomosis between the two placental masses, with one of the twins transfusing the other. The "transfuser" is smaller, and is very pale and anaemic, whereas the "transfused" twin is larger, plethoric and erythrocyanotic.

The transfuser twin may suffer from acute anaemia, particularly poorly tolerated since it develops rapidly, and in this case hypovolaemia must be corrected very rapidly, at birth. Although the appearance of the transfused twin is more reassuring, there are risks of hyperviscosity of the blood, connected with polyglobulism, and of heart failure attendant on hypervolaemia. Removal of some blood may be necessary if tolerance is unsatisfactory.

Aside from this quite specific syndrome, twins are exposed to all of the usual risks attached to prematurity and to smallness for date, which are often combined. Occasionally one of the twins dies in the uterus, and the surviving twin must receive special attention (detection of coagulation disorders, neurological monitoring).

The question of mono or dizygotism is of course often raised by the parents : while the answer is obvious for twins born within a single chorionic membrane, which are necesarily monozygous, it is not as clear for two twins of the same sex born in two membranes : they are not always dizygous (10 % are monozygous). Vascular anastomoses between the two umbilical circulations is only possible in a monochorionic pregnancy.

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As a concept, improved surveillance of the health of the mother-child dyad, leaving no gaps, is now self-evident, but the actual longitudinal monitoring of children from conception on has not yet become common practice.

The authors of the present study, like those who contributed to the issue on motherhood, use their own experience in France as well as in developing countries, to demonstrate how every act aimed at detecting risks during pregnancy, childbirth and the first days of the child's life, may play an all-important role in decreasing morbidity and mortality in mothers and children.

They emphasize the need to train mothers and community leaders, and show that preventive action may be developed even when resources are scarce ; they also stress the need for coordination between the paediatrician and the obstetrician-gynaecologist during this period of mothers' and children's lives.

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